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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXVII.

ADDITIONS TO THE AMERICAN AND PACIFIC ADENOSTEMMATINAE.

ADENOSTEMMA, GYMNOCORONIS AND SCIADOCEPHALA.

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The tribe Eupatorieae has been divided into four subtribes by B. L. Robinson (1913). The groups were largely artificial and have only nomenclatural significance at present. The Adenostemmatinae, however, represented, with the exclusion of the genus Hartwrightia, a natural group and one of the most distinctive elements in the tribe. No taxonomic study of the American or Pacific members of the group seems to have been undertaken in this Century and the present work is an effort to correct the various errors and omissions in the established generic and specific concepts.

The subtribe Adenostemmatinae has been rather accurately circumscribed in the past in spite of the lack of any one obvious unifying character. Most members of the group have the distinctive stout gland-tipped arms of the pappus but these are lacking in Gymnocoronis. The latter genus and Adenostemma share the usually greatly expanded soft style branches but these are lacking in Sciadocephala. Distinctive features of the subtribe that are common to all genera but are less obvious are in the structure of the receptacle. This is shown partially in the broad and rather indefinite bases of the involucre bracts. More definite is the persistence of soft tissue between the areolae allowing the latter to shift in position. In other Eupatorieae the cells of the ridges between the areolae are sclerified and sometimes highly ornamented.

The three genera of the Adenostemmatinae can be distinguished by the following key.

1. Pappus lacking; style glabrous Gymnocoronis
1. Pappus with 2-5 distinct gland-tipped knobs 2
2. Anther appendages longer than wide; style glabrous, with firm narrow branches Sciadocephala
2. Anther appendages not as long as wide; style often with numerous hairs on shaft, with soft usually expanded branches Adenostemma

The generic concepts are reenforced by additional characters. Adenostemma has anther collars more swollen in the lower part with few to many distinct subquadrate basal cells, while the other genera have only oblong basal cells with transverse annulations. Gymnocoronis has five ribbed achenes where the ribs expand more at maturity. Sciadocephala has the pappus knobs proportionately longer with the glandular tips short and sharply demarcated basally. In Adenostemma the glandular surfaces extend downward on the outer side of the knobs. Gymnocoronis has the anther appendages mostly recessed between the anther sacs and very emarginate at the tip while Adenostemma has appendages simply truncate. Some Old World species of Adenostemma may have less swollen anther collars or glabrous styles but do not otherwise depart from the overall generic pattern.

The evolution of the Adenostemmatinae most likely involves an ancestral form closer to Sciadocephala which has the firmer less expanded style branches and the longer ovate anther appendages. Such forms are the ones common in the rest of the Eupatorieae. Gymnocoronis seems less specialized than Adenostemma, but has more modified styles and anthers than Sciadocephala. Gymnocoronis retains traces of the pappus knobs in one species, G. nutans, where the knobs are very vestigial and have no specialized glandular tips. The genus Adenostemma has the greatest concentration of specialized features, including the setiferous styles and reduced anther appendages as well as the reduction to three angles or knobs on the achenes in most species.

Each of the genera of the subtribe has proven to need considerable revision.

ADENOSTEMMA

The genus as circumscribed here excludes two species, A. nutans is a Gymnocoronis and A. pakaraimae is a Sciadocephala. The remaining element of the genus Adenostemma still retains the great majority of the species in the subtribe and includes all the species that have reached the Eastern Hemisphere.

Although Sciadocephala also has gland-tipped pappus knobs, it is Adenostemma in which these structures seem to have functioned most successfully. The glandular part of the knobs produces a very sticky substance when mature and some achenes are still sticky after many years in the herbarium. It seems obvious that animals are common agents in the distribution of these achenes and birds have probably introduced the genus into the Eastern Hemisphere more than once. The genus is the most highly speciated member of the tribe in the African and Asiatic region. These Old World species are not well known though a recent study of those from Ceylon (Grierson, 1972) is very helpful. The distribution by animals seems to be successful only within limits and long range dispersal over larger areas of water is rare enough that most of the results have achieved species distinction.



Distribution of three Andean species of *Adenostemma*, dots *A. platyphyllum*, circles *A. fosbergii*, stars *A. cuatrecasasii*.

The reinterpretation of A. lavenia (L.) O.Kuntze shows that its elements are not conspecific as often assumed, and not even the West Indian and South American elements are the same. The South American A. brasilianum has also been interpreted too broadly. The species occurs naturally only in eastern South America. West Indian material under the latter name is A. berterii DC. and a single specimen from Nicaragua (Flint 1868 US) probably represents a recent introduction.

The direct effects of animals seem evident in the distributions of three species of Adenostemma in western South America. One of these species, A. platyphyllum Cass., ranges from the coast of Venezuela and Colombia with one station in Panama southward in Ecuador west of the Andes. The species reaches intermontane valleys in central Peru and occurs east of the Andes in Bolivia and northernmost Argentina. The species occurs mostly at low elevations. The second species, A. fosbergii, occurs on the average at slightly higher elevations beginning in the north in the Western Cordillera and first intermontane valley of the Cauca and Valle regions of Colombia. The species occurs in the second intermontane valley slightly farther south in Dept. Huila in Colombia. Elsewhere in Colombia and in Ecuador and northern Peru the species occurs only on the eastern slope of the Andes. The third species, A. cuatrecasasii, occurs at distinctly higher elevations in central and northern Colombia and in adjacent Venezuela. It seems remarkable that the three species would have such closely adjacent and extensive rather parallel distributions without any actual overlap. Two of the species have extended their ranges quite far north and south, each crossing the main ranges of the Andes at different places. It seems likely that there are distinctive bird migration patterns that would explain these distributions.

The distribution of Adenostemma in Central America seems unexpectedly limited. There is one species known from Guatemala, A. hirtiflorum Benth., which is quite distinctive in many features including the characteristic five knobs of the pappus. There are two species in the Greater Antilles, A. berterii DC., an erect growing plant and A. verbesina (L.) O.Kuntze, a mostly creeping plant. There are seven species in South America, including three that are undescribed. The seven species can be distinguished by the following key.

1. Leaves mostly elliptical, entire to subserrulate
A. suffruticosum
1. Leaves ovate or triangular, usually distinctly serrate or
 crenate 2
2. Plants mostly creeping, erect only near tips . A. verbesina
2. Plants mostly erect, procumbent only at base 3

3. Mature corollas not or scarcely exerted beyond the long involucre bracts; plants of higher elevations, above 1000 m in Colombia and Venezuela A. cuatrecasasii
3. Mature corollas distinctly exerted beyond involucre bracts; plants mostly of lower elevations 4
4. Leaves triangular with angulate lateral margins; plants of eastern South America 5
4. Leaves ovate without angulate lateral margins; plants of western South America to Bolivia and northern Argentina 6
5. Leaf blades longer than wide; involucre with prominent scarious margins; limb of corolla short and mostly hirsute A. involucreatum
5. Leaf blades about as wide as long; involucre bracts with only slight scarious margins; limb of corolla cylindrical and glabrous in lower part A. brasilianum
6. Corolla limb very short and densely hirsute; style branches not broadened distally A. fosbergii
6. Corolla limb cylindrical and glabrous in lower part; style branches greatly enlarged distally A. platyphyllum

Adenostemma verbesina (L.) O.Kuntze is rather widely distributed in South America, A. suffruticosum Gardn. is known only from eastern Brasil. The following three species from South America and one species from Fiji are previously undescribed.

Adenostemma cuatrecasasii R.M.King & H.Robinson, sp. nov.

Plantae erectae aliquantum grosse herbaceae usque ad 2 m altae annuae vel subperennes. Folia opposita, petiolis 2-11 cm longis superne sensim distincte alatis sub medio teretibus; laminae late ovatae vel subtriangulares usque ad 18 cm longae et 16 cm latae base rotundatae vel truncatae vel subcordatae abrupte late decurrentes margine valde serratae vel sinuatae ad apicem obtuse acutae supra et subtus perspersim puberulae prope basem valde trinervatae, nervis secundariis sensim valde ascendentibus. Inflorescentiae laxae profuse cymosae, pedicellis 5-18 mm longis dense glandulo-puberulis. Capitula 5-7 mm alta 5-10 mm lata; squamae involucri ca. 15-25 eximbricatae irregulariter biseriatae anguste oblongae subacutae vix vel non scariosae 4-5 mm longae base breviter connatae extus saepe glanduliferae. Flores ca. 15-55. Corollae albae 2.5-3.5 mm longae anguste infundibulares, tubis vix angustioribus, limbis elongatis extus pauca

glanduliferis, lobis base paucè vel dense setiferis; filamenta antherarum in parte superiore base dilatata 150-200 μ longis, cellulis plerumque subquadratis; thecae ca. 1 mm longae; scapi stylorum distincte setiferi, appendicibus grosse elongate clavatis usque ad 4 mm exsertis. Achaenia ca. 2.0-2.5 mm longa leniter curvata subtrigona plerumque dense glandulo-tuberculata; carpodia distincte obliqua; clavulae pappi plerumque 3 ca. 0.5-0.7 mm longae. Grana pollinis 18-20 μ diam.

Type: COLOMBIA: Cundinamarca: entre El Salto y El Colegio, 1680 m, March 10, 1940, Cuatrecasas 8237 (Holotype US). Paratypes COLOMBIA: Antioquia: Rio Anorí between Cruces and Madreseca, 800 m, Core 679 (US); Boyaca: extreme western part, region of Mt. Chapon, 3000 ft., Lawrance 178 (US); Cundinamarca: La Vega, 1300 m, Arbeláez & Cuatrecasas 5352 (US); Sasaima, vereda San Bernardo; La Mariá entre las quebradas La Mariá y La Victoria, 1850-1940 m, García-Barriga 12600 (US); Norte de Santander: Región de Sarare, entre el Alto del Loro y el Alto de Santa Inés, 1800-2200 m, Cuatrecasas, Schultes & E. Smith 12487 (US); Santander: Jordan, 10 k sse Landazuri, ca. 2300 m, Ewan 15671 (US); Tolima: Guindio, Triana 1160 (US); VENEZUELA: Mérida: Tabay 1800-2000 m, Gehringer 365 (US); Trujillo: entre Boconó y El Batatal, 1800 m, Steyermark & Rabe 97367 (US).

The new species is most closely related to A. platyphyllum Cass. but it can be distinguished rather easily by its somewhat larger size, by its more cordate or subcordate main leaves and by the higher elevations where it occurs. The most distinctive difference of the new species is the length of the involucre bracts which are pointed and mostly reach the level of the corolla lobes. The bracts of A. platyphyllum are particularly short and rounded at the tip in contrast. The new species has some variation with the Venezuelan specimens tending to have larger heads with more densely glanduliferous involucre bracts and less serrate leaf margins.

Adenostemma fosbergii R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae usque ad 1 m altae subperennes. Folia opposita, petiolis 1-7 cm longis superne sensim alatis sub medio teretibus; laminae late ovatae non angulatae usque ad 13 cm longae et 10 cm latae base rotundatae abrupte late decurrentes margine subintegrae vel subcrenatae ad apicem breviter acutae supra et subtus sparsim minute puberulae prope basem valde trinervatae, nervis secundariis valde ascendentibus. Inflorescentiae laxae profuse cymosae, pedicellis 7-21 mm longis dense minute puberulis non glanduliferis. Capitula ca. 3.5 mm alta ca. 4.0-4.5 mm lata; squamae involucri ca. 15-20 eximbricatae plerumque biseriatae oblongae vel ovoides ad apicem rotundatae anguste scarosae ca. 2.5 mm longae base breviter connatae extus subglabrae. Flores ca. 15-20. Corollae albae 1.3-1.5 mm longae, tubis distinctis ca. 0.5 mm longis paucè glanduliferis, limbis brevibus late campanulatis ca. 0.5 mm

longis extus dense setiferis; lobis 4-5; filamenta antherarum in parte superiore base dilatata ca. 150 μ longis, cellulis plerumque subquadratis; thecae ca. 0.5 mm longae, appendicibus subtriangularibus ca. 75 μ longis et 125 μ latis; scapi stylorum distincte setiferi, appendicibus late linearibus usque ad 1 mm exsertis. Achaenia ca. 2 mm longa leniter curvata subtrigona plerumque dense glandulo-tuberculata; carpopodia aliquantum obliqua; clavulae pappi plerumque 3 ca. 0.5 mm longae. Grana pollinis ca. 18 μ diam.

Type: COLOMBIA: Huila: 12 km ese of Garzón below Finca la Estrella on Quebrada Cucaracha, one of headwaters of Quebrada Damas, 2000 m, Fosberg 19918 (Holotype US). Paratypes COLOMBIA: Cauca: Micay Valley, "La Gallera", 1400-1500 m, Killip 7679 (US); Cundinamarca: "Susumuco" southeast of Quetame, 1200-1400 m, Pennell 1737 (US); Putumayo: rio San Miquel, en el afluente izquierda Quebrada de la Hormiga, 290 m, Cuatrecasas 11089 (US); Valle: hoya de Río Anchicayá, Quebrada del Dunubio, 300-350 m, Cuatrecasas 13721 (US); Valle: Cauca Valley, east of Zarzal, Quebrada Nueva to Cuchilla, 1100-1300 m, Pennell, Killip & Hazen 8487 (US); ECUADOR: Napo: at Río Suno, 3 km w of Río Napo, 400 m, Holm-Nielsen & Jeppesen 908 (AAU); Pastaza, vicinity of Puyo, 750-1000 m, Skutch 4546 (US); Tungurahua: Valley of Pastaza River, between Baños and Cashurco, 1300-1800 m, Hitchcock 21794 (US); PERU: Huanuco: Tingo María, 625-1100 m, Allard 20609 (US); Loreto: Divisoria, 59 km from Tingo María on highway to Pucallpa, ca. 1600 m, Allard 21804 (US); Loreto: Gamitanacocha, Río Mazán, 100-125 m, Schunke 262 (US); Loreto: lower Río Huallaga, 155-210 m, Williams 5164 (US); Loreto: Mishuyacu, near Iquitos, 100 m, Klug 222 (US); San Martín: Prov. de Lamas Trocha, Desquite-Cuñumbuqui, camino Sisa-Tarapoto, 1000-1200 m, Ferreya 7991 (US); Zepelacio, near Moyobamba, 1100-1200 m, Klug 3379 (US).

Adenostemma fosbergii is distributed along the eastern side of the Andes in Peru and Ecuador and crosses over to the Western Cordillera in Colombia. The species is very distinct by the short and densely hirsute corolla limbs and by the rather slender style branches. The heads are generally smaller than those of A. platyphyllum which is vegetatively similar. The new species also seems to occur at slightly higher elevations on the average than the related species. The short corolla and small style branches are most like A. viscosum Forst. of the Indian and Pacific Oceans and A. perrottetii DC. of Africa. Both the latter species differ primarily by the more pubescent leaves and involucre and by the lack of hairs on the style.

Adenostemma involucratum R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae usque ad 1 m altae subperennes. Folia opposita, petiolis usque as 10 cm longis superne sensim alatis sub medio teretibus; laminae ovato-triangulares vel hastatae usque ad 14 cm longae et 12 cm latae distincte longiores quam latiores base late cuneatae vel truncatae et abrupte longe

decurentes margine subintegrae vel partim argute dentatae ad apicem argute acutae vel breviter acuminatae supra et subtus sparsim minute puberulae prope basem valde trinervatae, nervis secundariis valde ascendentibus. Inflorescentiae laxae profuse cymosae, pedicellis 5-26 mm longis dense minute puberulis non glandiferis. Capitula 4-5 mm alta et 5-7 mm lata; squamae involucri ca. 15-20 eximbricatae extus subglabrae aliquantum regulariter biseriatae exteriores anguste oblongae ca. 2.0-3.0 mm longae interiores late obovatae ca. 2.5-3.5 mm longae ad apicem late rotundatae late scariosae. Flores ca. 15-25. Corollae albae 2.0-2.3 mm longae, tubis distinctis ca. 0.6 mm longis, limbis anguste campanulatis ca. 1 mm longis extus paucae glanduliferis; lobis 5 extus paucae setiferis; filamenta antherarum in parte superiore base dilatata ca. 100 μ longis, cellulis plerumque subquadratis; thecae ca. 1 mm longae, appendicibus truncatis ca. 80 μ longis et 300 μ latis; scapi stylorum distincte setiferi, appendicibus grosse elongate clavatis usque ad 3.0 mm exsertis. Achaenia ca. 2.0-2.5 mm longa leniter curvata subtrigona glandulifera vix tuberculata; carpodia distincte obliqua; clavulae pappi plerumque 3 ca. 0.5 mm longae. Grana pollinis ca. 23 μ diam.

Type: BRASIL: São Paulo: Ubatuba, Est. Exp., March 14, 1939, Killip 3498 (Holotype US). Paratypes: BRASIL: without precise locality, Gardner (US 1066363); Minas Gerais: Viçosa, State Agricultural School, Irwin 2700 (US); Parana: Morretes, entre Cabrestante e Pilão de Pedra, Hatschbach 14059 (US); Rio de Janeiro: Corcovado, Brook Trail between Sylvestre and Paineiras, 200-469 m, L.B. Smith & Vieira 1377 (US); Parque Nacional de Itatiaia, Barth 1117 (US); Itatiaia, Porto 2861 (US); Porte R. Doce, Esp. Santo - Matas do R. São Gabriel, Vieira 33 (US); Santa Catarina: Mina Velha, Garuva, S. Francisco do Sul, 10 m, Reitz & Klein 6259 (US).

The new species has triangular leaves similar to A. brasilianum (Pers.) Cass. which occurs in the same areas of eastern South America. The distinctions of the species include the leaf blades being longer than wide and more broadly cuneate at base, the involucre being more regular in its structure with more scarious margins on the inner bracts, the pedicels being essentially without glands, and the limbs of the corollas being shorter and more hirsute. The structure of the involucre is the most patterned that has been seen in the genus but the regularity is often broken by two or more scarious inner bracts or more rarely two narrower outer bracts occurring together.

Material of this species (Irwin 2700) is the source of a chromosome report of $n = 5$.

Adenostemma vitiense H. Robinson, sp. nov.

Plantae erectae herbaceae usque ad 1-2 m altae annuae vel subperennes. Folia opposita, petiolis 2-5 cm longis superne sensim distincte alatis sub medio teretibus; laminae late ovatae

usque ad 14 cm longae et 9.5 cm latae base late rotundatae abrupte decurrentes margine serratae ad apicem argute acutae supra perpaucis minute piliferae subtus distincte sparse minute glandulo-punctatae prope basem valde trinervatae, nervis secundariis sensim valde ascendentibus. Inflorescentiae laxae corymboso-paniculatae, pedicellis 6-25 mm longis hirtellis. Capitula 6-7 mm alta 8-10 mm lata; squamae involucri ca. 16-20 eximbricatae irregulariter biseriatae oblongae vel obovatae subacutae margine et apice plerumque anguste vel distincte scariosae 4.0-4.5 mm longae base breviter connatae extus distincte sparse puberulae. Flores ca. 20-30. Corollae albae ca. 2 mm longae anguste infundibulares extus multo glanduliferae, tubis subdistinctis usque ad 1 mm longis, limbis anguste infundibularibus extus hirsutis, lobis latioribus quam longioribus; filamenta antherarum in parte superiore base aliquantum dilatata 300-350 μ longa, cellulis plerumque subquadratis; thecae ca. 0.7 mm longae, appendicibus ca. 100 μ longis 250 μ latis; scapi stylorum glabri, appendicibus distincte leniter clavatis usque ad 2-3 mm exsertis. Achaenia ca. 3 mm longa leniter curvata biconvexa vel trigona sparse glandulifera non tuberculata; carpopodia distincte obliqua; clavulae pappi 2-3 ca. 0.7 mm longae. Grana pollinis 23-25 μ diam.

Type: FIJI: Viti Levu: Mba (formerly Tholo North), western slopes of Mt. Nanggara-nambuluta (Lomalangi), east of Nandarivatu, 1000-1100 m, A.C. Smith 4799 Holotype US). Paratype: FIJI: Nania, Wilkes s.n. (US).

Adenostemma vitiense seems unique in the glandular punctate lower surfaces of the leaves and it is one of the few species with nontuberculate achenes. The other species that has been seen from Fiji is A. viscosum Forst., described from the Society Islands and distributed from Hawaii to Ceylon. This latter species has short narrow style branches and a very short corolla limb in addition to tuberculate achenes. The Forster species seems to be the same as A. parvifolium (Bl.) DC. originally described from Java. A third species, A. lanceolatum Miq., occurring in the Pacific and perhaps occurring in Fiji, has long exserted style branches, usually less sharply pointed leaves and tuberculate achenes. Glabrous styles are apparently characteristic of all the Pacific species of Adenostemma.

GYMNOCORONIS

The species of the genus are characteristically marsh plants occurring in two widely separated areas of Latin America.

The genus is represented in South America by a single species, G. spilanthoides (D. Don.) DC. Blake (1923) thought it necessary to revert to the later name G. attenuata DC. for this species, but what Blake interpreted as a homonym for G. spilanthoides should be treated simply as a miscitation of author.

The species is known primarily from Paraguay, Uruguay and adjacent Argentina with one collection from Bolivia. A still more northward extension of the natural range is now known from extreme western Brazil: Terr. do Acre: Sumpfpflanze am Ufer des Rio Mamoré bei Guajaramirim, Jan. 1965, St. Vogel 369 (US). A collection from the coast of North Carolina dating from 1888 seems to represent a short-lived introduction.

The genus Gymnocoronis in Mexico seems more complex and the number of collections is less than adequate. The present study has arrived at only limited conclusions that should be carefully rechecked against future collections. The specimens include one with densely glanduliferous corollas. All other specimens have corollas with few or no glands. The strictly alternate branches of the inflorescence are an additional but perhaps unreliable distinction of the more glanduliferous material described below as a new species. Among the less distinctive members of the genus in Mexico the oldest name is G. latifolia Hook. & Arn., described originally from Jalisco. On the basis of a Blake photograph of the type and an additional specimen from the southern coast of Chiapas the species seems to have rather narrow bases on most of its leaves and seems to be restricted to the Pacific Coast of Mexico. The remaining specimens from along the Gulf Coast of Mexico with opposite basal branches of the inflorescence and generally broader leaf bases include G. nutans, originally described as an Adenostemma, and perhaps a second species, G. sessilis Blake. The Blake species was separated from G. latifolia by the obviously sessile leaves but the relationship to the previously described Adenostemma nutans was not recognized. The latter species had been placed in Adenostemma because of the vestigial knobs at the top of the Achene. The knobs are so vestigial that they are probably of more significance for phyletic interpretation than for taxonomy. Still, such knobs have not yet been seen in any other specimens and the involucre bracts of the type specimen are more broadly rounded than the bracts of any other specimen. It would be premature to reduce G. sessilis to synonymy, but a new combination is required for G. nutans in any case.

Gymnocoronis nutans (Greenman) R.M.King & H.Robinson, comb. nov.
Adenostemma nutans Greenman, Field Mus. Bot. 2: 344. 1912.

Gymnocoronis matudae R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae minimum 40 cm altae non ramosae. Caules castanei hexagoni striati glabri. Folia plerumque opposita sessilia oblonge elliptico-lanceolata usque ad 13 cm longa et 4 cm lata base cuneata et vix amplexicaulia margine crenulato-serrulata apice anguste acuta supra et subtus glabra, nervis secundariis paucis subpinnatis ascendentibus. Inflorescentiae corymboso-paniculatae, ramis alternatis glabris vel paucae minute glanduliferis, pedicellis 7-13 mm longis saepe

cernuis. Capitula 4-6 mm alta et 4-6 mm lata; squamae involucri ca. 20 eximbricatae plerumque biseriatae anguste oblongae 3.5-4.5 mm longae apice obtusae vel anguste rotundatae interdum lanceolatae non scarosae extus sparse glanduliferae. Flores ca. 50. Corollae ca. 3.2 mm longae extus multo glanduliferae, tubis basilaribus brevibus ca. 0.7 mm longis, limbis cylindricis, lobis 5 triangularibus 300-400 μ longis ca. 400 μ latis; filamenta antherarum in parte superiore crassa ca. 350-400 μ longis; thecae ca. 1 mm longae; rami stylorum valde incrassati. Achaenia ca. 3 mm longa 5-costata intercostate dense glandulifera; pappus nullus. Grana pollinis 18-20 μ diam.

Type: MEXICO: Campeche: Palizada, July 25-28, 1939, Matuda 3844 (Holotype US).

The species is distinguished by the densely glanduliferous corollas and the strictly alternate branches of the inflorescence.

SCIADOCEPHALA

The genus is known only from northern South America and has previously had only one recognized species. The original description by Mattfeld (1938) and another collection from near the type locality in coastal Ecuador have provided a clear concept of the type species. It has been rather surprising to find that a more recent collection from the interior of Colombia that has been placed under the name is a totally distinct species. This second species is of further interest because of the form of its nectary which seems unique in the family. A final surprise is the existence of a third species from British Guiana which has been described as an Adenostemma. At present the three species are separated in the three main isolated areas of moist tropical low lands in northern South America, the Pacific Coastal, the Amazonian, and the Guianian. The three species can be distinguished by the following key.

1. Plants creeping; leaves broadly ovate with rounded to truncate bases S. pakaraimae
1. Plants erect; leaves elliptical to ovate-lanceolate with cuneate bases 2
 2. Leaves entire, with secondary veins pinnate in 4-5 pairs S. amazonica
 2. Leaves serrate-dentate, with few secondary veins, lower veins prominently trinervate . . . S. schultze-rhnhofiae

The three species of Sciadocephala are as follows:

Sciadocephala schultze-rhönhofiae Mattf., Notizbl. Bot. Gart.
Berlin 14: 42. 1938.

Sciadocephala pakaraimae (Maguire & Wurdack) R.M.King & H.Robinson, comb. nov. Adenostemma pakaraimae Maguire & Wurdack,
Mem. New York Bot. Gard. 9: 366. 1957.

Sciadocephala amazonica R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae usque ad 40 cm altae perennes. Caulis base decumbentes superne evanescentiter breviter rufo-hirsuti anguste fistulosi. Folia opposita, petiolis 5-15 mm longis; laminae ellipticae vel anguste obovatae 5-9 cm longae et 2-4 cm latae base cuneatae margine integrae ad apicem obtusae vel breviter acutae supra et subtus sparsim minute puberulae, nervis pinnatis, paribus secundariis ca. 5 valde ascendentibus. Inflorescentiae subcymosae paucae capitatae, pedicellis ca. 1-2 cm longis puberulis. Capitula ca. 1 cm alta ca. 3-4 mm lata; squamae involucri ca. 10 plerumque uniseriatae plerumque 5-7 mm longae lineari-lanceolatae extus sparsim puberulae ad apicem anguste obtusae base vix connatae. Flores ca. 9. Corollae albae 6-7 mm longae anguste infundibulares extus sparsim puberulae, tubis indistinctis, lobis triangularibus ca. 0.8 mm longis et 0.5 mm latis; filamenta antherarum in parte superiore ca. 0.6 mm longa; thecae ca. 1.8 mm longae, appendicibus ovatis ca. 300 μ longis et 250 μ latis; nectaria ad apicem setifera; styli glabri, appendicibus linearibus. Achaenia 6-8 mm longa sparsim puberula; carpodia leniter asymmetrica; clavulae pappi 4-6 plerumque 3 ca. 3.5 mm longae, partibus glanduliferis discretis ca. 0.3 mm longis. Grana pollinis argute spinosa ca. 30 μ diam.

Type: COLOMBIA: Amazonas: Loretoyacu River, 100 m, Oct. 1945, Schultes 6674 (Holotype US).

The new species differs from S. schultze-rhönhofiae Mattf. most noticeably in the leaves which are entire with many pairs of secondary veins pinnately arranged. In the Mattfeld species the leaves are prominently serrate and there are only two remote pairs of secondaries with the lower pair forming a trinervate base of the lamina. The new species is also distinct in the feature that seems unique in the entire family, the presence of hairs on the tip of the nectary. Other Asteraceae have nectar-ies of various shapes and with variously positioned stomata but none have previously been seen with any kind of pubescence.

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Adenostemma cuatrecasasii R.M.King & H.Robinson, Holotype,
United States National Herbarium. Photos by Victor E. Krantz,
Staff Photographer, National Museum of Natural History.



Adenostemma fosbergii R.M.King & H.Robinson, Holotype,
United States National Herbarium.



Adenostemma involucreatum R.M.King & H.Robinson, Holotype,
United States National Herbarium.



Adenostemma vitiense H. Robinson, Holotype, United States National Herbarium.



FLORA MEXICANA

Mexico: L. Matudae

Gymnocoronis matudae R.M. King & H. Robinson

Gymnocoronis matudae R.M. King & H. Robinson, Holotype, United States National Herbarium.



Sciadocephala amazonica R.M.King & H.Robinson, Holotype,
United States National Herbarium.



Enlargements of heads of Adenostemmatinae. Top left; Adenostemma cuatrecasatii. Top right; A. fosbergii. Middle left; A. involucratum. Middle right; A. vitiense. Bottom left; Gymnocoronis matudae. Bottom right; Sciadocephala amazonica.

ADDITIONAL NOTES ON THE GENUS AMASONIA. VI

Harold N. Moldenke

AMASONIA L. f.

Additional & emended synonymy: Diplostemma Neck. apud P. DC., Prodr. 7: 306, sphalm. 1838 [not Diplostemma Steud. & Hochst., 1838]. Tachigalea Griseb. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 1030, in syn. 1895 [not Tachigalia Aubl., 1775]. Hassleria Briq. ex Moldenke, in Fedde, Repert. Spec. Nov. 46: 194, in syn. 1939. Hassleria "Briq. ex Moldenke" apud Hill & Salisb., Ind. Kew. Suppl. 10: 251, in syn. 1947. Diplostemma DC. apud Airy Shaw in Wills, Dict. Flow. Pl., ed. 7, 365, in syn. 1966. Amsonia Stearn, Humb. Bonpl. Kunth Trop. Am. Bot. 16, sphalm. 1968 [not Ansonia Walt., 1788].

Additional & emended bibliography: Scop., Introd. Hist. Nat. 169. 1777; L. f., Suppl. Pl., pr. 1, 48 & 294. 1781; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 887, 890, 922, & 965. 1789; A. L. Juss., Gen. Pl., ed. 1, 109, 119--123, & 418 (1789) and ed. 2, 109, 119--123, & 418. 1791; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 2, 2: 887, 890, 922, & 965. 1796; Lam., Tabl. Encycl. Méth. Bot. [Illustr.] 3: pl. 543. 1797; Raeusch., Nom. Bot., ed. 3, 378. 1797; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 205 (1817) and ed. quart., 2: 253. 1818; Pers., Sp. Pl. 3: 355. 1819; Reichenb., Conspect. Reg. Veg. 1: 117. 1828; Voigt, Hort. Suburb. Calc. 473. 1845; Schau., Linnaea 20: 484. 1847; Schnitzl., Icon. Fam. Nat. Reg. Veg. 137. 1856; Griseb., Fl. Brit. W. Ind., pr. 1, 501. 1861; Bocq., Rev. Verbénac. 7, 49, 50, 54, 64, 69, 75, & 86 (thesis). 1862; Bocq., Adansonia, ser. 1, 2: 87, 110, 111, 117, 119, 121, 128--130, 134, 144, 149, 155, 156, & 163 (1862) and 3: 183 & 217--219, pl. 5, fig. 11--18. 1863; Bocq., Rev. Verbénac. 87, 110, 111, 117, 119, 121, 128--130, 134, 144, 149, 155, 156, 163, 178, 180, 183, & 217--219, pl. 5, fig. 11--18. 1863; Pfeiffer, Nom. Bot. 1 (1): 135. 1873; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1132--1136 & 1147. 1876; Anon., Handelsbl. Tuinb. Sempervirens 14: 201 & 204. 1885; Anon., Journ. Hort. & Cottage Gard., ser. 3, 10: 435--436, fig. 109. 1885; [Lebl], Illustr. Gartenzeit. Stuttg. 29: 193, pl. 26. 1885; W. Robinson, Garden 27: 130--131, pl. 479. 1885; Beck von Mannagetta & Abel, Wien. Illustr. Gartenzeit. 15: 68--69, fig. 9. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 103 & 769. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 156. 1894; Möller, Deutsch. Gärtn.-Zeit. 9: 141--142. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 1030 & 1032. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 23. 1901; Barnhart, Bull. Torrey Bot. Club 29: 590. 1902; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 419. 1906; M. Kunz, Anatom. Untersuch. Verb. 58--59. 1911; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1335. 1926; Benoist, Arch. Bot. Caen 5, Mém. 1: 258. 1931; Benoist, Bois Guyan. Franç. 259. 1933; Moldenke, Brittonia 1: 260. 1934; L. f., Suppl. Pl., pr. 2, 48 & 294. 1936; A. W. Hill, Ind. Kew. Suppl.

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It should be noted that there is also a genus Diplostemma of Steudel & Hochstetter which is a synonym of Geigeria Griessselich in the Carduaceae. Although Airy Shaw (1966) credits this same generic name to De Candolle, consultation of the De Candolle reference shows that this author there plainly credits the name to Necker.

The Amsonia of Stearn (1968) is plainly the result of a typographic error — Humboldt, Bonpland, & Kunth distinctly spell the name "Amasonia" in the work referred to by Stearn. Amsonia Walt. is a handsome genus in the Apocynaceae.

The generic name Tachigalea, accredited to Grisebach by Jackson (1895), occurs in the Grisebach work (1861) only as "Tachigalea campestris Aubl." — an obvious error in spelling of Taligalea campestris Aubl. Tachigalia Aubl. is a genus in the Caesalpinia-ceae. This Grisebach reference has previously been cited by me, and by numerous other workers, as "1864", the title-page date, but pages 315 [bis] to 506 were actually issued in 1861.

According to Rickett & Stafleu (1960) "7156. Amasonia Linnaeus f., Suppl. 48, 294. 1781 sem. 2", typified by "A. erecta Linnaeus f.", is conserved by the International Code of Botanical Nomenclature over "Taligalea Aublet, Pl. Guiane 625. 1775", typified by "T. campestris Aublet." Stafleu (1972) also tells us that the type species of Amasonia is A. erecta L. f. and of Taligalea is T. campestris — both of these binomials are regarded by me as synonyms of Amasonia campestris (Aubl.) Moldenke. Barkley (1965) lists Hassleria among the valid genera of Verbenaceae, but in my opinion it is a complete and undoubted synonym of Amasonia.

Encke (1960) records the common German name for the members of this genus as "Amasonie" and gives the following description of the group: "(Thomas Amason, amerikanischer Reisender, wahrscheinlich des 18. Jahrhunderts). Halbsträucher, mit wechselständigen, gezähnten Blättern und gelben oder schwefelgelben Blüten in verlängerten, endständigen Trauben oder in rispigen Trauben oder einzeln in den Achseln grösserer und kleinerer — wie Kelch und Blütenstiele — rotgefärbter Deckblätter. Kronröhre lang, gerade oder am Grunde gebogen. Kronsaum 5spaltig, mehr oder weniger 2lippig. Kronabschnitte ausgebreitet oder zurückgebogen. — Etwa 8 Arten im tropischen Amerika."

In reviewing the systematic position of this genus, Troncoso (1974) says: "Briquet en Die nat. Pflanzenfamilien, 1897 ubica Amasonia (sub Taligalea Aubl.) en la Tribu Monochileae de la Subfam. Verbenoideae por su fructo drupáceo con 4 pirenas uniseminadas, sin tener en cuenta su inflorescencia de tipo cimoso. Este criterio fue adoptado por Moldenke, 1959. Por el contrario, Schauer en el Prodrómus, 1847 lo considera en la Subtribu Viticeae Sch., junto con Aegiphila, Tectona, Callicarpa, Clerodendrum, Vitex, etc., todos géneros de inflorescencia definida, cimosa. Esta misma posición adopta Junell, 1934 basándose en el estudio de la estrictura del

ovario que dice ser la misma que en el género Clerodendrum, Según mi opinión éste es el criterio más correcto a seguir, correspondiéndole por sus caracteres la siguiente ubicación en el sistema, Subfam. Viticoideae, Tribu Clerodendreae." In this connection it is rather interesting to note that Junell (1934), in coming to this apparently very important taxonomic conclusion examined ovarian material from seven species of the 570 taxa at present accepted in this genus.

The Grubb, Lloyd, Pennington, & Whitmore 140, distributed as Amasonia, is not verbenaceous.

AMASONIA ANGUSTIFOLIA Mart. & Schau.

Additional & emended bibliography: Bocq., Adansonia, ser. 1, 3: [Rev. Verbénac.] 219. 1863; Kuntze, Rev. Gen. Pl. 2: 509. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 103. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 419. 1906; M. Kunz, Anatom. Untersuch. Verb. 58. 1911; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 419. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 103. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 12. 1947; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 419. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 103. 1960; Moldenke, Phytologia 7: 339. 1961; El-Gazzar & Wats., New Phytol. 69: 483 & 485. 1970; Moldenke, Fifth Summ. 1: 146 & 389 (1971) and 2: 639 & 850. 1971; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58 & 61. 1973.

Recent collectors describe this plant as an herb, 30 cm. tall, the upper leaves and stems red, the corollas yellow, and found it growing in open grassy savannas, blooming in November. The type specimen, G. Gardner 3411, was photographed in the herbarium of the Botanisches Museum in Munich by Macbride as his type photograph number 20345, while an isotype in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva is the basis of his type photograph number 28390.

Additional & emended citations: BRAZIL: Amazônas: Ducke 1903 (W—1908343); France, Pena, & Ramos 3370 (Ld, N, S). Goiás: G. Gardner 3411 [Macbride photos 20345 & 28390] (F—830281—photo of isotype, F—684152—photo of type, F—686619—photo of type, N—photo of type, V—294783—photo of isotype, W—photo of isotype, W—photo of type). Pará: Spruce s.n. [In vicinibus Barra] (V—294705).

AMASONIA ARBOREA H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 205. 1817.

Additional synonymy: Amasonia arborea (Aubl.) Moldenke, Phytologia 4: 454, in syn. 1953. Amazonia arborea H.B.K. ex Moldenke, Phytologia 28: 453, in syn. 1974.

Additional & emended bibliography: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 205 (1817) and ed. quart., 2: 253. 1818; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 103. 1893; Barnhart, Bull. Torrey Bot. Club 29: 590. 1902; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 103. 1946; Moldenke in Dawson, Los Angeles Co.

Mus. Contrib. Sci. 7: 11. 1957; Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 238. 1958; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 103. 1960; Moldenke, Phytologia 7: 339—340. 1961; Moldenke, Fifth Summ. 1: 122, 129, 131, 133, 146, & 389 (1971) and 2: 840. 1971; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 49 & 58—61. 1973; Moldenke, Phytologia 28: 453. 1974.

Recent collectors describe this plant as a perennial herb, sub-ligneous herb, or a shrub, simple-stemmed, 0.5—1 m. tall, the leaves blue-green, purple beneath, and the bracts red, deep-red, crimson, or scarlet. The corollas are described as having been "yellow" on Steyermark & Bunting 102910, "lemon-yellow" on Philcox & Freeman 4659, and "greenish-white" on Maguire, Maguire, & Wilson-Browne 46050a. It has been found growing in dry forests and in rain-forests, under subshrubs, or "occasional" on escarpments, at altitudes of 125—915 m., flowering in April and September.

It should be noted here that the Humboldt, Bonpland, & Kunth reference dates given above — correcting the one given by me in my original monograph (1939) — have been authenticated by the late Dr. John Hendley Barnhart (1902).

Material of Amasonia arborea has been misidentified and distributed in some herbaria as A. campestris (Aubl.) Moldenke. On the other hand, the Petitbon 62, distributed as A. arborea, is actually A. campestris, while Lourteig 1803, Philipson, Idrobo, & Fernandez 1488, and R. E. Schultes 5665 are A. lasiocaulos Mart. & Schau.

Additional & emended citations: VENEZUELA: Amazonas: Cardona 166 (W—1832666); Foldats 3718 (N, Ve—47282, W—2340452), 3864 (N, Ve—47308, W—2340461); Holt & Blake 471 (W—1517871), 483 (W—1517880), 729 (W—1519322); Holt & Gehringer 273 (W—1471983); Maguire, Cowan, & Wurdack 29458 (W—2058976); Maguire, Wurdack, & Bunting 36787 (W—2174991); Steyermark & Bunting 102910 (N); Ll. Williams 15175 (W—1878502). Bolívar: Bernardi 1488 (N); J. A. Steyermark 90207 (Ca); Wurdack & Monachino 41047 (N). GUYANA: Maguire, Maguire, & Wilson-Browne 46050a (W—2563597). BRAZIL: Amazonas: Holt & Blake 461 (W—1517862); J. A. Steyermark 104031 (N). Maranhão: G. Gardner 6084 (V—294784). Mato Grosso: Philcox & Freeman 4659 (N). Pará: Black, Egler, Cavalcante, & Silva 57-19542 (S); Killip & Smith 30322 (W—1463447).

AMASONIA CALYCINA Hook. f.

Additional synonymy: Taligalea punicea Hort. ex Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 23, in syn. 1901 [not T. punicea (Vahl) Poir., 1806].

Additional & emended bibliography: W. Robinson, Garden 27: 130—131, pl. 479. 1885; [Lebl], Illustr. Gartenzeit. Stuttgart 29: 193, pl. 26. 1885; Anon., Handelsbl. Tuinb. Sempervirens 14: 201 & 204. 1885; Anon., Journ. Hort. & Cottage Gard., ser. 3, 10: 435—

436, fig. 109. 1885; Meehan, Gard. Month. & Hort. 27: 300—301. 1885; Regel, Gartenfl. 35: 336—338, fig. 35. 1886; Hook. f. in Curtis, Bot. Mag. 113 [ser. 3, 43]: pl. 6915. 1887; Veitch, Cat. Pl. 1889: pl. 27. 1889; Beck von Mannagetta & Abel, Wien. Illustr. Gartenzeit. 15: 68—69, fig. 9. 1890; Kuntze, Rev. Gen. Pl. 2: 509. 1891; Möller, Deutsch. Gärt.-Zeit. 9: 141—142. 1894; Pucci, Bull. Soc. Tosc.ortic. 22: 232—233, pl. 10. 1897; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 23 (1901) and pr. 1, 419. 1906; Veitch, Hort. Veitch. 226. 1906; Stapf, Ind. Lond. 1: 164. 1929; Moldenke in Fedde, Repert. Spec. Nov. 46: 217—219. 1939; Moldenke, Lilloa 4: 306—307. 1939; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 23 & 419. 1941; Moldenke, Phytologia 2: 200. 1946; Moldenke in Cheesman, Fl. Trin. & Tob. 2 (6): 399. 1955; Moldenke, Fam. 2 Verbenac. 18. 1955; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 23 & 419. 1959; Encke, Pareys Blumengärtn., ed. 2, 444. 1960; Graf, Exotica 3: 1483 & 1531. 1963; Encke, Schönst. Kalt & Warmhauspfl. 393. 1968; Foley, Flow. World Wilson 254. 1969; Moldenke, Fifth Summ. 1: 129, 354, & 389 (1971) and 2: 639 & 850. 1971; Encke & Buchheim in Zander, Handwörterb. Pflanzennam., ed. 10, 102. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58. 1973; Troncoso, Darwiniana 18: 401 & 408. 1974.

Illustrations: W. Robinson, Garden 27: 130, pl. 479 [in color]. 1885; [Lebl], Illustr. Gartenzeit. Stuttgart 29: pl. 26. 1885; Anon., Handelsbl. Tuinb. Sempervirens 14: 204. 1885; Anon., Journ. Hort. & Cottage Gard., ser. 3, 10: 436, fig. 109. 1885; Meehan, Gard. Month. & Hort. 27: 300—301. 1885; Regel, Gartenfl. 35: fig. 35. 1886; Hook. f. in Curtis, Bot. Mag. 113 [ser. 3, 43]: pl. 6915 [in color]. 1887; Veitch, Cat. Pl. 1889: pl. 27. 1889; Beck von Mannagetta & Abel, Wien. Illustr. Gartenzeit. 15: 69, fig. 9. 1890; Möller, Deutsch. Gärt.-Zeit. 9: 142. 1894; Pucci, Bull. Soc. Tosc.ortic. 22: pl. 10. 1897; Veitch, Hort. Veitch. 226. 1906; Encke, Pareys Blumengärtn., ed. 2, 444. 1960; Graf, Exotica 3: 1531. 1963.

In the Journal of Horticulture and Cottage Gardener (1885) the anonymous author says that "This is one of the distinct new plants which Messrs. Veitch & Sons (to whom we are indebted for the illustration) from time to time introduce to the public, and their description of it, as follows, appears to be very accurate — 'This is unquestionably one of the most beautiful of flowering shrubs that have been brought under the notice of horticulturists for many years. It was introduced by us from British Guiana through our collector, Mr. Davis Burke. It is of direct habit, with elegant spreading foliage; the leaves are of elliptic-lanceolate form, from 9 to 10 inches long. The inflorescence is very brilliant, being particularly striking from having a series of the richest vermilion-crimson Poinsettia-like spreading bracts arranged in pairs along the entire length of the racemes, which are a foot long; these bracts, the lowermost of which are 4 inches long, are very persistent, remaining in perfection fully two months. From the base of each bract are produced pendulous tubulous flowers, in twos and threes, of a creamy white colour, offering a striking contrast to the rich colouring of the other

parts of the inflorescence.' Two first-class certificates have been awarded to this plant -- one last year by the Floral Committee of the Royal Horticultural Society, and the other last week at the Royal Botanic Society's Show at Regent's Park. Those honours sufficiently indicate the merit of the plant, which, by its long-continued brightness and apparent easiness of culture, is likely to find its way into most gardens where stove decorative plants are grown."

Encke (1960) has the following to say about this plant: "Brit. Guayana. Winter. 30—60 cm hoher, wenig odor gar nicht verzweigter Halbstrauch. Blätter länglich- oder elliptisch-lanzettlich, 15—30 cm lang, unregelmässig gezähnt oder ausgebuchtet, mit Ausnahme der obersten Blätter glatt. Blüten hell schwefelgelb, 4—5 cm lang, hängend. Kelch etwa 2 1/2 cm lang, wie die Blütenstiele rot. Deckblätter gross, rot, mit purpurroten Haaren besetzt, nach dem Abfallen der Blüten bis 3 Monate lang an der Pflanze haftend. — 1881.....Prachtvolle, viele Monate lang blühende Warmhauspflanze für Schausammlungen und Liebhaber, auch für warme, geschlossene Wintergärten. Kultur im Warmhaus, hell, luftig und feucht, in lehmig-humoser oder in Einheitserde. Vermehrung durch Stecklinge im geschlossenen Warmbeet bei 25—30°." In his 1963 work he gives almost the same description but adds "Leider ist diese prachtvolle und dankbare Pflanze fast völlig aus den Sammlungen verschwunden. Man sollte sie wieder einführen. Sie gehört ins Warmhaus, wo sie genauso kultiviert wird wie Clerodendrum speciosissimum. Die Vermehrung erfolgt durch Stecklinge, die im geschlossenen Warmbeet bei 25—30° bald wurzeln. Leider aber bilden die Mutterpflanzen nur wenige Stecklinge, da sie sich so gut wie gar nicht verzweigen, so dass es oft schwierig ist, auf diese Weise zu einem gewissen Bestand zu kommen."

I am indebted to my very esteemed friend, Dr. J. L. van Soest, for the following summary of the "Sempervirens" article about this plant: "on p. 201 there is a short notice about Amasonia. It tells that it is imported from Brit. Guyana by David Burke for James Veitch & Sons. It is still expensive to buy, but it is to be hoped that the price will go down in future. It is mentioned a year ago (1884) by Gardeners Chronicle, the Garden and Journal of Horticulture. The figure is = 1/2 x. No author and no names of the editorial staff and no indication from where the illustration is taken."

Graf (1963) describes it as a "subshrub with scattered oblong, toothed leaves 6—12 in. long; flowered with colored bell-shaped calyx and long corolla tube, sulphur-yellow in nodding purple-hairy racemes, bracts red."

Lebl (1885) says "Diese unstreitig wertvolle Neuheit wurde von dem Sammler David Burke in British Guiana entdeckt, an der Firma Veitch in London gesendet und von da aus in den Handel gegeben. Die hervorragendsten englischen Fachzeitschriften sprechen sich sehr günstig über die Pflanze aus und die königl. Gartenbaugesellschaft in London belohnte sie mit einem Zeugnis I. Klasse. Amasonia punicea ist von aufrechtem, üppigem Wuchs und hat elegant aufge-

breitete, elliptisch-lanzettförmige Blätter von ca. 22--25 cm Länge. Der reizende Blütenstand besteht aus zwei Reihen reich hochroter Brakteen längs der ca. 30 cm langen Blütenähre und aus je 2--3 beisammenstehenden, abwärtsabhängenden Röhrenblumen von rahmweisser Farbe, die aus den Achseln der Brakteen oder Deckblättern zum Vorschein kommen. Die Deckblätter, von welchen die untersten 10 cm lang sind, sehen jenen von Poinsettia pulcherrima ähnlich und behalten ihre Schönheit volle 2 Monate. So lautet die Beschreibung dieser Pflanze, auf die wir die Aufmerksamkeit der Blumenfreunde lenken." The identical illustration is reproduced here as is found also in the Sempervirens article, on p. 142 of Möller's work, and in the Journal of Horticulture and Cottage Gardener article.

Möller (1894) follows Hooker (1887) in distinguishing between this cultivated plant and the A. punicea of Vahl [now known as A. campestris (Aubl.) Moldenke] under whose name it was originally distributed to gardeners. He says "Eine andere, durch die Herren Veitch ' Sohn aus Britisch-Guyana eingeführte und vielfach falschlich als A. punicea verbreitete Art ist A. calycina Hook. (Syn.: A. punicea Hort. non Vahl). Es ist dies ebenfalls eine prächtige Pflanze, die sich von der echten A. punicea Vahl hauptsächlich durch den breiteren Kelch und durch die verschieden geformten Brakteen deutlich unterscheidet; ebenso sind auch die Zipfel des Kelches grösser und lang zugespitzt. A. calycina ist ebenfalls ein Halbstrauch mit 15--30 cm langen, elliptisch oder länglich lanzettförmigen, zugespitzten Blättern, die grob oder unregelmässig gebuchtet oder gezähnt sind und zu einem 3--5 cm langen Blattstiel sich verengern. Sie sind gänzlich glatt, mit Ausnahme der am Blütenstande sitzenden Blätter, die oft hellrot gefleckt sind. Der 15 bis 25 cm lange Blütenstand ist etwas geneigt, reichlich belaubt und schwach mit roten bis purpurfarbenen Haaren besetzt. Die Brakteen oder Blütendeckblätter sind glatt, sichelförmig gebogen und zugespitzt, die oberen oft blütenlos oder nur mit unvollkommen ausgebildeten Blumen versehen.

"Die unmittelbar am Blütenstande befindlichen Blütendeckblätter sind öfters ganz hellrot, öfters auch wieder grün mit Hellrot gefleckt oder scharlachrot in Grün verlaufend.

"Die Blumen selbst sind kurzgestielt, hängend und 4 bis 5 cm lang. Der Kelch ist fast 2 1/2 cm lang, glatt und ebenfalls hellrot gefärbt. Die Korolla ist mattschwefelgelb, zylindrisch geformt, leicht gebogen und schwach behart, mit Ausnahme des kurzen, verengten Teiles der Röhre im Grunde des Kelches.

"Es sind jener zu Schnitzwecken verwendbaren Pflanzen, die sich gleich den Amsonien, Bougainvilleen und Poinsettien durch lebhaft gefärbte Blütenhüllblätter auszeichnen, nicht sehr viele. Umso mehr ist es geraten, ihre Kultur zur Ausbildung zu bringen, weil durch ihren Blütenstand der Blumenbindekunst ein ganz eigenartig schön wirkender Werkstoff zugänglich gemacht wird.

"Wir haben zu unserem Bedauern sowohl von der Amasonia punicea wie auch von der A. calycina in Deutschland eine Vorlage für die bildliche Veranschaulichung nicht aufzutreiben vermocht und geben

deshalb die Darstellung der erstgenannten nach einer in E. Pynaert's 'Revue de l'Horticulture Belge et Etrangère' veröffentlichten Farbentafel und der letzteren nach einer englischen Vorlage wieder, deren eigentlichen Ursprung wir nicht zu ermitteln in der Lage waren.

"Die übrigen etwa 8 bis 10 noch bekannten, zu dieser Gattung gehörenden Spezies sind bisjetzt noch nicht eingeführt; da sie auch keine besonders hervorragenden blumistischen Eigenschaften aufweisen, so dürften sie wol nur für botanische Gärten Wert haben." [It should be noted that the Pynaert illustration which he reproduces seems to represent A. spruceana Moldenke, rather than the true A. calycina.]

AMASONIA CAMPESTRIS (Aubl.) Moldenke

Additional & emended synonymy: Amasonia erecta L. f., Suppl. Pl., pr. 1, 294. 1781. Tachigalea campestris Aubl. ex Griseb., Fl. Brit. W. Ind. 501, sphalm. 1861. Amasonia erecta L. ex Bocq., Adansonia, ser. 1, 3: 219. 1862. Amasonia campestris (Aubl.) Moldenke, Résumé Suppl. 3: 30, in syn. 1962. Amasonia campestris (Aubl.) Moldenke, Résumé Suppl. 15: 16, in syn. 1967. Amasonia campestris (Aubl.) Moldenke, Phytologia 25: 235, in syn. 1973.

Additional & emended bibliography: Aubl., Hist. Pl. Guian. 2: 625, pl. 252. 1775; L. f., Suppl. Pl., pr. 1, 294. 1781; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 922 & 965 (1789) and ed. 13, pr. 2, 2: 922 & 965. 1796; Rausch., Nom. Bot., ed. 3, 182. 1797; Vahl, Eclog. Amer. 2: 51. 1798; Poir. in Lam., Encycl. Méth. Bot. 7: 556. 1806; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 205 (1817) and ed. quart., 2: 253. 1818; Pers., Sp. Pl. 3: 355. 1819; Steud., Nom. Bot., ed. 2, 1: 74. 1840; Voigt, Hort. Suburb. Calc. 473. 1845; Schau., Linnaea 20: 484. 1847; Schau. in A. DC., Prodr. 11: 677. 1847; Schau. in Mart., Fl. Bras. 9: 291—293. 1851; Griseb., Fl. Brit. W. Ind., pr. 1, 501. 1861; Bocq., Adansonia, ser. 1, 2: 76, 87, 110, 156, & 163 (1862) and 3: 219, pl. 5, fig. 11—18. 1863; Bocq., Rev. Verbénac. 76, 87, 110, 156, 163, & 219, pl. 5, fig. 11—18. 1863; Anon., Journ. Hort. & Cottage Gard., ser. 3, 10: 435—436, fig. 109. 1885; [Lebl], Illustr. Gartenzeit. Stuttg. 29: 193, pl. 26. 1885; Kuntze, Rev. Gen. Pl. 2: 509. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 103. 1893; Möller, Deutsch. Gärtner-Zeit. 9: 141—142. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 1032. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 157. 1895; Hook. f. in Curtis, Bot. Mag. 121: pl. 7445. 1895; Pucci, Boll. Soc. Tosc.ortic. 22: 232—233, pl. 10. 1897; Barnhart, Bull. Torrey Bot. Club 29: 590. 1902; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 480. 1904; M. Kunz, Anatom. Untersuch. Verb. 58—59. 1911; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 419. 1906; Pulle, Enum. Pl. Surinam. 402. 1906; Gleason, Bull. Torrey Bot. Club 58: 463. 1931; Moldenke, Torreya 34: 8. 1931; Junell, Symb. Bot. Upsal. 4: 107, pl. 7, fig. 2. 1934; L. f., Suppl. Pl., pr. 2, 294. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 14. 1938; Moldenke in Fedde, Repert. Spec. Nov. 46: 210—216. 1939; Moldenke, Lilloa 4: 305—306. 1939; Mol-

denke, Prelim. Alph. List Invalid Names 4, 5, & 42. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 419. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 103 (1946) and pr. 2, 2: 1032. 1946; Moldenke, Phytologia 2: 200. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 12 & 227. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 2. 1947; Moldenke, Phytologia 2: 502. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 57, 62, 65, 67, 68, 75, 156, & 176. 1949; F. C. Hoehne, Ind. Bibl. & Num. Pl. Col. Com. Rondon 346. 1951; Moldenke in Cheesman, Fl. Trin. & Tob. 2 (6): 398—399. 1955; Moldenke, Fan. 2 Verbenac. 17—18. 1955; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 419. 1959; Braga, Pl. Nordest., ed. 2, 88 & 100. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 103 (1960) and pr. 3, 2: 1032. 1960; Moldenke, Phytologia 7: 340—341. 1961; Griseb., Fl. Brit. W. Ind., pr. 2, 501. 1963; Van Donselaar, Wentia 14: 70. 1965; Moldenke, Résumé Suppl. 12: 3. 1965; Huinink, Wentia 17: 136—137. 1966; J. A. Steyermark, Act. Bot. Venez. 3: 156. 1968; Van Donselaar, Meded. Bot. Mus. Rijks-univ. 306: 404. 1968; Foley, Flow. World Willson 254. 1969; Lasser, Act. Bot. Venez. 4: 48. 1969; Teunissen & Wildschut, Verh. Konink. Nederl. Akad. Wet. Natuurk. 59 (2): 28 & table 2. 1970; Moldenke, Fifth Summ. 1: 111, 122, 129, 131, 133, 147, 354, & 389 (1971) and 2: 639 & 850. 1971; Teunissen & Wildschut, Meded. Bot. Mus. Utr. 341: 28 & table 2. 1971; Stafleu, Internat. Code Bot. Nom. 354. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58—61. 1973; Moldenke, Phytologia 25: 235 (1973) and 28: 463. 1974; Troncoso, Darwiniana 18: 400, 401, & 408, fig. 39. 1974.

Illustrations: Aubl., Hist. Pl. Guian. 4: pl. 262. 1775; Lam., Tabl. Encycl. Méth. Bot. 3: pl. 543. 1797; Vahl, Eclog. Amer. 2: pl. 20. 1798; Bocq., Adansonia, ser. 1, 2: pl. 5, fig. 11—18. 1863; Bocq., Rev. Verbénac. pl. 5. 1863; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 157. 1895; Hook. in Curtis, Bot. Mag. 121: pl. 7445 [in color]. 1895; Troncoso, Darwiniana 18: 400, fig. 39. 1974.

Recent collectors describe this plant as an erect perennial herb, a half-shrub, or a subshrub, 0.3—2 m. tall, usually with a single erect stem and no branches, or occasionally with red branches, the leaves scattered along the stem, the midrib and veins purple beneath, the inflorescences 30—50 cm. tall, the hairs dark-violet, the bracts red, bright-red, dark-red, or cardinal-red to vermillion or even "brown-purple", or else "greenish outside and red inside", the calyx red or dark-red, the corollas yellow or pale-yellow to cream-color, the filaments white, the anthers brown or mustard-green, and the fruit green or light-green to yellowish-green when immature, turning black at maturity. The Sastres say "nervures face inférieure des feuilles rougeâtres, tiges rouges; bractées rouges, nervures face inférieure vertes saillantes; pédoncules rouges, sépales vert rougeâtres, pétales jaunes grande racine pivotante blanche; fruits immatures verts."

The corollas are said to have been "yellow" on Cavalcante 2409, D. H. Davis 43, and J. A. Steyermark 86561, "pinkish-white" on W.

R. Anderson 7732, and "cream" on Irwin, Harley, & Smith 30808; on Davis 903 the label states "bracts and flowers red", but this is most certainly due to an error in observation on the part of the collector.

The Eitens describe the plant as a "low subshrub, the flowers 22 mm. long from base of the calyx plus 8 mm. more of projecting style, face of corolla (looking into its mouth) 11 x 12 mm., outside of corolla light-green tinged with red, upper surface of limb light-green with reticulate red lines, filaments whitish, anthers mustard-green, ripe berry spherical, 7 mm. in diameter, black." They encountered it growing in a "chapada" of tall trees in deciduous to evergreen xeromorphic tree woodland (cerradão) on the tops and sides of sandstone plateaus and some low flat land, at 300 m. altitude, flowering and fruiting in April. It should be pointed out that the fruits are actually drupes, not "berries".

The plant has been found growing in forest shade, in open woods, on savannas, in thickets in savanna meadows near streams, in hammocks in the middle of savannas, on white or gray sand of dry savannas of Byrsonima verbascifolia, in sandy cerrado or on cerrado slopes, in "cerrado xeromorphic arboreal woodlands", and in cutover semi-deciduous forests on slopes. Goodland found it in the partial shade of shrubs on dry lateritic ridged savanna grassland with scattered trees, the dominant plants being Curatella, Byrsonima, Trachypogon, and Fimbristylis. Anderson found it in cerrado in an area of "mesophytic woods by stream, open marshy place near stream, and cerrado on hillsides above". Lens encountered it on loamy soil of savannas dominated by Trachypogon and Curatella americana. Irwin and his associates report it from cerrado in regions of gallery forest and adjacent cerrado in Goiás and assert that it is "infrequent in cerrado" in Bahia. The Eitens found it "on natural lithosol campo, in the stony soil on top of bedrock sandstone pavement".

Amasonia campestris has been found at altitudes of 300 to 1000 meters, flowering (in addition to the months previously reported by me) in August and fruiting in February and March. Huinink (1966) states that it is found in the Polycarpaeo-Trachypogonetum cyperetosum and Polycarpaeo-Trachypogonetum curatellatosum associations. The vernacular names, "cacho vermelho", "cola de gallo", and "mendóca", are recorded for it, and it is said to be used by natives in the treatment of stomach inflammations. Peckolt (1904) says of it "Ein Strauch der Staaten vom Äquator bis zum 9.º südl. Br.....Das Dekokt der Blätter ist ein Volksmittel beim Gonorrhöe."

The type specimen of Taligalea campestris, Aublet s.n., in the herbarium of the British Museum (Natural History) in London, was photographed there by F. G. Meyer as his type photograph number 4070. The type specimen of A. velutina, Blanchet 3156, was photographed by Macbride in the DeCandolle Herbarium at the Conservatoire et Jardin Botaniques in Geneva and is his type photograph number 7887.

It should also be noted here that the Humboldt, Bonpland, and

Kunth reference dates given in the emended bibliography above have been authenticated by Barnhart (1902). It is interesting to note, also, that Raeuschel (1797) gives the native habitat of A. erecta as Surinam and of A. taligalea as "Guiana".

Foley (1969) describes what he calls Amasonia punicea as a "pretty flowering plant, native of British Guiana. Each shoot terminates in a raceme of many white tubular flowers each 1" long and subtended by a bright red bract which persists for a couple of months after the flowers have fallen." Obviously, he is speaking of A. calycina Hook. f. (the "A. punicea Hort.", not A. punicea Vahl). Similarly, the description and illustration given by Pucci (1897) refer to A. calycina — they are merely copies of those in Illustr. Gartenzeit. (1890), Möller's Deutsch. Gärtn.-Zeit. (1894), etc.

Steyermark (1968) cites J. A. Steyermark 86561 & 88488. Material of A. campestris has been distributed in some herbaria as "Amazonia sp." On the other hand, the Maguire, Maguire, & Wilson-Browne 46050a, distributed as Amasonia campestris, is actually A. arborea H.B.K., while Murça Pires & Cavalcante 51993 is A. hirta Benth. and Prance & Silva 58720 is A. lasiocaulos Mart. & Schau. Maguire & Stahel 22782 is a mixture with Aegiphila laevis (Aubl.) Gmel. — its label is inscribed "Frequent; liana", a statement which doubtless applies to the Aegiphila portion of the number.

Additional & emended citations: TRINIDAD & TOBAGO: Trinidad: Britton, Coker, & Rowland 112 (W-1046816); W. E. Broadway 2138 (F-248873), 6950 (F-972241); Eggers 1003 (Ca-453283, V-98099), 1389 (W-1148085); D. G. Fairchild s.n. [Feb. 15, 1932] (E-1082993, W-1626013); Ryan s.n. [Macbride photos 22773] (F-687347-photo); Warming 207 (W-1234850); Webster, Ellis, & Miller 9653 (S). VENEZUELA: Anzoategui: H. Pittier 15089 (W-1876257). Bolívar: Maguire, Wurdack, & Bunting 35955 (W-2174984); Pannier 822 (Ve-51181); J. A. Steyermark 86561 (W-2486289), 88488 (N); Ll. Williams 13420 (W-1800636). Guárico: Aristeguieta 2317 (Ve-43038), 4206 (Ve-46120), 5669 (N); Blydenstein 273 (Ve-49237); Tamayo 4115 (Ve-38421, W-2220993). Monagas: Tamayo 3488 (Ve-51403). Sucre: Lasser & Vareschi 3883 (Ve-38121). GUYANA: Cowan & Soderstrom 1759 (W-2370483), 1771 (W-2370484, W-2370485); D. H. Davis 43 (N), 903 (N); Goodland 209 (Ld, W-2546183); A. S. Hitchcock 16956 (W-1056155, W-1056156); Irwin 301 (W-2172640), 593 (Au-165480), 1039 (Au-165661); Jenman 5567 (W-57332, W-1323169); Rob. Schomburgk 228 (V-294781, V-294785, W-702593); A. C. Smith 2441 (F-1023682). SURINAM: Archer 2772 (W-1592347); D. G. Fairchild s.n. [March 3, 1932] (W-1626066); Hostmann 893 (V-111721, V-294780), 1409 (V-123450); Lems 640223 (N); Maguire & Stahel 22782, in part (W-1902626); Wulfschlägel 403 (V-132182, V-161105), 1982 (V-132181).

FRENCH GUIANA: Aublet s.n. [F. G. Mey. photo 4070] (Gz--photo of type, N--photo of type); W. E. Broadway 176 (G, W--1068512), 747 (W--1068901); Mélinon 82 (F--539771, W--1123381); Petitbon 62 (P); Poiteau s.n. [Cayenne] (V--125539); Sagot 424 (V--122956), 1312 (V--122957), s.n. (Pd); Sastre & Sastre 21 (N, P), 44 (N, P), 219 (P, P); Schnell 11068 (P), 11082 (N). BRAZIL: Amapá: Black & Lobato 50-9434 (Ca--91482); Irwin & Westra 47249 (N); Maguire & Maguire 47025 (W--2563594); Murça Pires, Rodrigues, & Irvine 51102 (W--2563595), 51120 (W--2563596). Bahia: Blanchet 3156 [Macbride photos 7887] (F--645561--photo, F--686411, F--869622, F--923105--photo, W--photo); Irwin, Grear, Souza, & Reis dos Santos 14681 (Ld); Irwin, Harley, & Smith 30808 (Ld, N). Ceará: Freire Allemão 1168 (W--1199360); G. Gardner 1987 (V--294782); Luetzelburg 26095 (F--912251), 26162 (F--836465). Goiás: W. R. Anderson 7732 (Ub); Irwin, Grear, Souza, & Reis dos Santos 14494 (N); Irwin, Maxwell, & Wasshausen 21253 (N), 21390 (Ac). Maranhão: Eiten & Eiten 3586 (N, W--2445203), 3914 (W--2445200), 4158 (N, N, W--2445197, W--2445212), 4353 (W--2445215), 10374 (W--2687975), 10505 (W--2701739). Minas Gerais: Belém & Mendes 451 (Ac); Irwin, Reis dos Santos, Souza, & Fonseca 23879 (Ac, N). Pará: Archer 7606 (W--2439056); Cavalcante 2409 (Ld, N); Drouet 2125 (F--949436, Mi, W--1594742); Guedes 100 (Ba); Mexia 5924a, in part (E--1068925); Monteiro da Costa 263 (F--693999); Murça Pires & Silva 10524 (Ld). Piauí: G. Gardner 2276, in part (V--294706). Trauíra Island: Frões 1862 (E--1041569, F--707013, W--1660174). LOCALITY OF COLLECTION UNDETERMINED: Herb. Barbier s.n. (P).

AMASONIA CAMPESTRIS var. SURINAMENSIS Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 46: 216. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 33 & 36. 1942; Moldenke, Phytologia 2: 200. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 67 & 176. 1949; Moldenke, Résumé 76 & 442. 1959; Moldenke, Fifth Summ. 1: 131 (1971) and 2: 850. 1971; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58 & 61. 1973.

López-Palacios (1973) feel that this plant may yet be found in Bolívar or Amazonas, Venezuela.

AMASONIA HIRTA Benth.

Additional synonymy: Gesnera pilosa Glaz. ex Moldenke, Phytologia 23: 431, in syn. 1972. Gesneria pilosa Glaz. ex Moldenke, Phytologia 23: 431, in syn. 1972 [not G. pilosa Hort., 1847].

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 103. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 419. 1906; M. Kunz, Anatom. Untersuch. Verb. 58. 1911; Moldenke in Fedde, Repert. Spec. Nov. 46: 203--205. 1939; Durand

& Jacks., Ind. Kew. Suppl. 1, pr. 2, 419. 1941; Moldenke, Lilloa 6: 313. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 103. 1946; Moldenke in Dawson, Los Angeles Co. Mus. Contrib. Sci. 7: 11. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 419. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 103. 1960; Moldenke, Phytologia 7: 341. 1961; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 831 & i, map 1377. 1971; Moldenke, Fifth Summ. 1: 147 & 185 (1971) and 2: 639 & 850. 1971; Moldenke, Phytologia 23: 431. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58. 1973; Troncoso, Darwiniana 18: 399, 401, & 408, fig. 38. 1974.

Illustrations: Troncoso, Darwiniana 18: 399, fig. 38. 1974.

Recent collectors describe this plant as a tall erect herb, subshrub, or small shrub, 0.25—1 m. tall, the stems simple, in clumps, red or reddish, the leaves softly hairy, dark-green above, paler beneath, the inflorescence apex nodding, the bracts red, reddish, or red-orange to orange-red, orange, or scarlet, sometimes described as "yellow-green to red or rusty-red", "yellow to red-orange", "yellow-green and red", or "red inside and greenish outside". The calyx, similarly, is described as red, reddish, bright-red, orange-red, or scarlet, yellow-green and red, yellow-green to rusty-red, or sometimes orange-yellow. The immature fruits are described as green or yellow-green. Irwin and his associates speak of "heads violet-brown" and "heads cream", but I am not certain to what they are here referring since there are no capitate inflorescences in this genus.

The corollas are said to have been "white" on R. P. Belém 477, "cream" on Irwin, Anderson, Stieber, & Lee 34164, 34509, & 34750, Irwin, Grear, Souza, & Reis dos Santos 12305, Irwin, Harley, & Smith 32793, Irwin, Maxwell, & Wasshausen 11840 & 18824, Irwin, Onishi, Fonsêca, Souza, Reis dos Santos, & Ramos 25008 & 26161, and Irwin, Reis dos Santos, Souza, & Fonsêca 23990 & 24967, "yellow" on Murça Pires & Cavalcante 51993, "pinkish-yellow" on Irwin, Onishi, Fonsêca, Souza, Reis dos Santos, & Ramos 25748, "pinkish-cream" on Philcox & Fereira 3886, and "cream, pinkish in throat" on Irwin, Souza, & Reis dos Santos 11389. On Philcox & Fereira 4374 they are described as "corolla-tube fawnish-cream". Some collectors have described the calyx as "reddish-green".

The plant has been found growing among grasses on campo slopes and among newly invading vegetation, in cerrado, on rocky slopes, in grassy cerrado on very dry soil, on dry campos, in stony pastured campos on gentle slopes or in pastured cerrado, in wet places on campo on rocky slopes, in cerrado in areas of brejo (wet sedge meadow), cerrado, and gallery woods, cerrado and adjacent slope forest. Irwin and his associates describe it as common on campos; others refer to it as frequent at gallery margins and on upland savannas and have found it on campos in regions of cerrado on steep slopes surrounded by campo. It has been collected at altitudes of 700—1250 meters, flowering from January to March, in July, and in October, fruiting from January to March and in July.

Irwin & Soderstrom aver that it is "infrequent" in Goiás.

Kuntze (1891) reduces A. lasiocaulos Mart. & Schau. to the synonymy of A. hirta, a disposition with which I cannot agree.

Oliveira describes A. hirta as an "arbustinho, cálice vermelho, pétalas brancas tubulosas, estames e anteras brancas" and "flôr evermelhada" and found it in a high forest on sandy terra-firma (non-inundated land). The Eitens call it a "tall herb, petals pale light-yellow, filaments pale light-yellow, anthers yellow, calyx in flower pale-peach tinged with green, in fruit reddish-peach". A vernacular name recorded for the plant is "mendoca".

A specimen of Martius 583 in the herbarium of the Botanisches Museum in Munich was photographed there by Macbride as his type photograph number 20346 and another of the same collection at the Conservatoire et Jardin Botaniques in Geneva as his type photograph number 7886, but this collection is not one on which the species was based. The type of Gesneria pilosa is Glaziou 21835 from Goiás, Brazil, deposited in the herbarium of the Muséum National d'Histoire Naturelle in Paris.

Some material of A. hirta has been misidentified and distributed in some herbaria as A. campestris (Aubl.) Moldenke.

Additional & emended citations: BRAZIL: Amapá: Murça Pires & Cavalcante 51993 (Ld, N, S). Distrito Federal: R. P. Belém 477 (Ac, Ld, N); Irwin, Souza, & Reis dos Santos 11389 (Ac); Murça Pires, Silva, & Souza 9458 (B). Goiás: Glaziou 21835 (P); Harley, Barroso, & al. 11431 (N); Irwin, Anderson, Stieber, & Lee 34161 (Ub), 34164 (N), 34509 (Ld, N, W--2709617), 34750 (Ac, N, W--2709859); Irwin, Grear, Souza, & Reis dos Santos 12305 (Ac), 14296 (Ld); Irwin, Harley, & Smith 31820 (Ac), 32793 (Ld, N, W--2709810); Irwin, Maxwell, & Wasshausen 18824 (Ac), 18840 (Ld); Irwin, Onishi, Fonsêca, Souza, Reis dos Santos, & Ramos 25008 (Ld, N); Irwin, Reis dos Santos, Souza, & Fonsêca 23990 (Ac, N), 24967 (Ld, N); Irwin & Soderstrom 7227 (N). Mato Grosso: Malme 1318 (W--1483471); Martius 583 [Macbride photos 7886 & 20346] (E--134932, F--645724--photo, F--684153--photo, N--photo, W--photo); Philcox & Ferreira 3886 (N), 4374 (N); Retter, Bertoldo, Castro, Santos, & Souza R.915 (N). Minas Gerais: Eiten & Eiten 3566 (N, W--2445209); Irwin, Onishi, Fonsêca, Souza, Reis dos Santos, & Ramos 25748 (Ac, N), 26161 (Ac); Macedo 195 (W--2197254); Tamberlik s.n. (F--876324). Pará: E. Oliveira 4448 (N), 4469 (N); Spruce s.n. [In vicinibus Barra] (F--686366), s.n. [In vicinibus Santarem, 1850] (V--294708). São Paulo: L. Riedel 37x (W--1573644), s.n. [Villa Franca, June 1834] (W--1573647).

AMASONIA LASIOCAULOS Mart. & Schau.

Additional synonymy: Amasonia lasiocaulis Mart. & Schau. ex Kuntze, Rev. Gen. Pl. 2: 509, in syn. 1891.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks.,

Ind. Kew., pr. 1, 1: 103. 1893; M. Kunz, Anatom. Untersuch. Verb. 58—59. 1911; Hill & Salisb., Ind. Kew. Suppl. 10: 227. 1947; Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 238. 1958; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 689—690. 1960; Moldenke, Phytologia 7: 341. 1961; Moldenke, Fifth Summ. 1: 115, 139, 147, & 389 (1971) and 2: 639 & 950. 1971; Moldenke, Phytologia 23: 418. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58 & 61. 1973; Moldenke, Phytologia 28: 437, 438, & 453. 1974.

Recent collectors describe this plant as an herb, 20—50 cm. tall, or a shrub, 1—1.5 m. tall, the stem leafless below, the upper leaves whorled, purple beneath or bright-red or red when young and maroon when adult, the inflorescence rosy-coral or scarlet, the bracts red, cardinal-red, or vermillion to scarlet, or bright-red when young and maroon when adult, the calyx red or scarlet, the corollas lemon-yellow or cream, and the immature fruit green, becoming deep-red when mature. The corollas are said to have been "yellow" on Prance & Silva 58720, "light-green" on Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 11782, and "red" on Silva & Souza 2278.

The plant has been found growing in clay or limestone soil in dense humid or shaded forests or in moist forests on white sand, at altitudes of 400—600 meters, flowering from July to September (in addition to months previously reported by me), and fruiting in February, August, and November. Cowan & Soderstrom report it "locally occasional" in Guyana, while Miss Lourteig refers to it as "rare" in Amapá, Brazil. A vernacular name reported for it is "mendoca", the same as is used for other species of the genus. López-Palacios (1973) thinks that it may yet be found in Amazonas or Bolívar, Venezuela. Macbride (1960) cites only Allard 20522 from San Martin, Peru.

The Eitens call A. lasiocaulos a subshrub, with the bracts red, the corollas light-green, the filaments and style light-green, and the anthers light-brown. They encountered it growing in virgin upland semideciduous mesophytic forest 11 m. tall, the tree canopy over 60 percent, with a few shrubs, the ground layer of dense marantaceous herbs and low Olyra-like grass [this type of forest is locally called "carrasco"], flowering in January.

Material has been misidentified and distributed in some herbaria as A. arborea H.B.K., A. campestris (Aubl.) Moldenke, or "Amazonia arborea H.B.K."

Additional & emended citations: COLOMBIA: Méta: Philipson, Idrobo, & Fernandez 1488 (W—2026146). Vaupés: Cuatrecasas 7017 (W—1774224); R. E. Schultes 5665 (W—1875040). GUYANA: Cowan & Soderstrom 1712 (Fg, W—2678022). BRAZIL: Acre: Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 11782 (Ld, N). Amapá: Egler & Irvine 46426 (N); Lourteig 1803 (W—2595102); Murça Pires, Rodrigues, & Irvine 50308 (N), 50761 (N). Amazonas: Prance, Pena, Ramos, & Monteiro 2203 (N); Ule 8961 (W—1615262). Maranhão: Eiten & Eiten 10275 (W—2689051). Pará: Dahlgren & Sella 534 (F—

602561), 637 (F—602980); Kauffmann 5 (F—603452); Mexia 5924a, in part (F—670942, F—670943); Prance & Silva 58720 (N, W—2514755); Silva & Souza 2278 (N). MOUNTED ILLUSTRATIONS: Schau. in Mart., Fl. Bras. 9: pl. 48. 1851 (N, Z).

AMASONIA OBOVATA Gleason

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 14. 1938; Fedde & Schust. in Just. Bot. Jahresber. 59 (2): 416. 1939; Moldenke, Phytologia 7: 341. 1961; Moldenke, Fifth Summ. 1: 122 (1971) and 2: 850. 1971; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 58, 60, & 61. 1973.

López-Palacios asserts (1973) that "Sin embargo, en algunos ejemplares de A. campestris de los Llanos venezolanos se encuentran también brácteas obovadas."

AMASONIA SPRUCEANA Moldenke

Additional synonymy: Amasonia sprucena [Moldenke] ex López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 59, sphalm. 1973.

Additional bibliography: Seghers, Rev. Hort. Belg. 20: 13—15. 1894; Möller, Deutsch. Gärt.-Zeit. 9: 141--142. 1894; A. W. Hill, Ind. Kew. Suppl. 9: 14. 1938; Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 238. 1958; Moldenke, Phytologia 7: 342. 1961; Moldenke, Fifth Summ. 1: 115, 122, 147, & 354 (1971) and 2: 850. 1971; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 49 & 58—61. 1973; Moldenke, Phytologia 28: 453. 1974; Troncoso, Darwiniana 18: 401 & 408. 1974.

Illustrations: Seghers, Rev. Hort. Belg. 20: 13 (in color). 1894; Möller, Deutsch. Gärt.-Zeit. 9: 141. 1894.

Recent collectors have found this plant growing in forests on terra-firma (non-inundated land), flowering and fruiting in October, and describe the plant as a shrub, 1 m. tall, with white flowers and red fruit. López-Palacios (1973) wonders if this taxon may not be merely an anomalous form of A. arborea H.B.K.

An isotype of A. spruceana, Spruce 3288, in the Delessert Herbarium at the Conservatoire et Jardin Botaniques at Geneva was photographed there by Macbride as his type photograph number 28391.

Additional & emended citations: COLOMBIA: Vaupés: Cuatrecasas 6853 (W—1774674). VENEZUELA: Amazonas: Spruce 3288 [Macbride photos 28391] (F—686512—istotype, F—830282—photo of isotype, V—294707—istotype, W—photo of isotype). BRAZIL: Amazonas: Prance, Maas, Woolcott, Monteiro, & Ramos 15818 (Id, N).

ADDITIONAL NOTES ON THE GENUS BOUCHEA. IV

Harold N. Moldenke

BOUCHEA Cham.

Additional synonymy: Fovearia L. C. Rich. ex Moldenke, Alph. List Invalid Names 24, in syn. 1942. Buchea Cham. ex Moldenke, Alph. List Invalid Names Suppl. 1: 3, in syn. 1947. Beuchea Troncoso, Darwiniana 18: 302, sphalm. 1974.

Additional & amended bibliography: Breyn., Prod. Fasc. Rar. Pl. Anno 1679 Hort. 1680; Breyn., Prod. Fasc. Rar. Pl. Secund. 104. 1689; Pluk., Phytogr. 2: pl. 70, fig. 1, & pl. 321, fig. 1. 1691; Sloane, Cat. Pl. Ins. Jamaic. 64. 1696; Moris., Pl. Hist. Univ. Oxon. 3: 418 ["408"] & 419. 1699; Ray, Hist. Plant. 3: Suppl. 285 & 286. 1704; Herm., Cat. Plant. Nond. 13 & 15. 1705; Breyn., Prod. Fasc. Rar. Pl. Prim. & Sec. 2: 104. 1739; Crantz, Inst. Rei Herb. 1: 572. 1766; [Retz.], Nom. Bot. 11. 1772; Christm. & Panzer, Vollst. Pflanzensyst. Houttuyn 5: 121—122. 1779; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 41 (1789) and ed. 13, pr. 2, 2: 41. 1796; Raeusch., Nom. Bot., ed. 3, 3. 1797; Balbis, Cat. Pl. Hort. Bot. Taur. 48. 1804; Pers., Sp. Pl. 3: 351. 1819; Peterm., Cod. Bot. Linn. Ind. Alph. 196. 1840; Steud., Nom. Bot., ed. 2, 2: 629 & 750. 1841; Voigt, Hort. Suburb. Calc. 473. 1845; Schau., Linnaea 20: 478. 1847; D. Clos, Ann. Sci. Nat., ser. 3, 10: 378—381. 1848; C. Gay, Hist. Fis. Chile Bot. 5: 25—27 & Atlas 1: pl. 55. 1849; Schnitzl., Icon. Fam. Nat. Reg. Beg. 137. 1856; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 1, 241. 1861; Bocq., Adansonia, ser. 1, 2: 89, 110, 115, 124, 125, 127, 128, 132, 139, 143, & 146—148 (1862) and 3: 180—182, 184, 185, 235—237, & 241, pl. 16. 1863; Bocq., Rev. Verbénac. (repr.) 89, 110, 115, 124, 125, 127, 128, 132, 139, 143, 146—148, 180—182, 184, 185, 235—237, & 241, pl. 16. 1863; Griseb., Cat. Pl. Cuba 214. 1866; Harv., Gen. S. Afr. Fl., ed. 2, 288 & 290. 1868; R. A. Phil., Anal. Univ. Chil. 35: 193. 1870; Pfeiffer, Nom. Bot. 1 (1): 450 & 702 (1873) and 2 (1): 759. 1874; A. Gray, Syn. Fl. N. Am., ed. 1, 2 (1): 333—335. 1878; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 564. 1885; Trimen, Journ. Ceylon Br. Roy. Asiat. Soc. 9: [Syst. Cat. Flow. Pl. Ceylon] 68. 1885; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 117. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 327, 349, & 753 (1893) and pr. 1, 2: 504, 564, & 567. 1894; T. R. Sims, Sketch & Check-list Fl. Kaffr. 63. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 974 & 1178. 1895; Robinson & Greenm., Am. Journ. Sci. 150 [ser. 3, 50]: 147. 1895; Trimen, Handb. Fl. Ceylon 3: 347—348. 1895; Just, Bot. Jahresber. 23 (2): 76. 1897; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 273 & 281—283. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 61. 1901; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 466. 1904; M. Kunz, Anatom. Untersuch. Verb., 38—41. 1911; J. Matsumura, Ind. Pl. Jap. 2 (2): 533. 1912; Loes., Verh. Bot. Ver. Brand. 53: 79 [Abhandl.

244]. 1912; Prain, Ind. Kew. Suppl. 4, pr. 1, 28. 1913; Chiov., Result. Scient. Miss. Stef. 1: 143. 1916; Prin, Ind. Kew. Suppl. 5m pr. 1, 35. 1921; Gamble, Fl. Presid. Madras 6: 1085 & 1089. 1924; Bews, Pf. Forms & Evol. S. Afr. 156 & 188. 1925; Eritton & P. Wils., Scient. Surv. Porto Rico 6: 137 & 142—143. 1925; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366]. 1932; Steyerma. & Moore, Ann. Mo. Bot. Gard. 20: 801. 1933; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746—747. 1934; P. C. Standl., Field Mus. Publ. Bot. 18: 993. 1938; Tharp, Veg. Tex. 67. 1939; Robledo, Lecc. Bot. 2: 498. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 61. 1941; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569 & 571. 1941; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 653. 1941; Savage, Cat. Linn. Herb. Lond. 4. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 327, 349, & 753 (1946) and pr. 2, 2: 504, 564, & 567. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 33 & 222. 1947; Selling, Bishop Mus. Spec. Publ. 38: 274 & 394. 1947; E. D. Merr., Ind. Raf. 204. 1949; Metcalfe & Chalk, Anat. Dicot. 1031, 1032, & 1040. 1950; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 1, 1: 302. 1951; Kearney, List Citations Place Publ. Spp. Ariz. 19 [thesis]. 1951; Rambo, Sellowia 3: 72 & 78. 1951; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448 & 449, fig. 256 C & D. 1952; Arnoldo, Zakfl. 125—126, 154, & 163, pl. 55, fig. 119. 1954; Rambo, Sellowia 6: 59, 67, & 153. 1954; J. B. Gillett, Kew Bull. Misc. Inf. 1955: 132—135. 1955; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 2, 1: 302. 1956; Rambo, Sellowia 7: 207. 1956; Angely, Fl. Paran. 7: 4 & 11. 1957; Moldenke, Biol. Abstr. 31: 561. 1957; Schnack & Fehleisen, Darwiniana 11: 245—255. 1957; Vélez, Herb. Angiosp. Lesser Ant. 116. 1957; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Cave, Ind. Pl. Chromosome Nos. 1: vi & 53. 1958; R. C. Foster, Contrib. Gray Herb. 184: 169. 1958; Humbert, Fl. Sahara Sept. & Cent. 407. 1958; Prain, Ind. Kew. Suppl. 4, pr. 2, 28. 1958; Van Campo, Bull. I. F. A. N. 20 (A-3): 753—760. 1958; Anon., Kew Bull. Gen. Index 1929—1956, 47. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 61. 1959; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; G. Taylor, Ind. Kew. Suppl. 12: 23. 1959; Angely, Liv. Gen. Bot. Bras. 35 & 39. 1960; Howell & McClintock in Kearney & Peebles, Ariz. Fl., ed. 2, 730. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 327, 349, & 753 (1960) and 2: 504, 564, & 567. 1960; Kevorkian, Phytopath. 43: 406. 1960; Kevorkian, Mycologia 52: 523—524. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 611 & 656—657. 1960; Martin & Noel, Fl. Albany & Bathurst 92. 1960; Prin, Ind. Kew. Suppl. 5, pr. 2, 35. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 149. 1960; Rambo, Pesquis. Bot. 4: 18 (1960) and 12: 21. 1961; Kevorkian, Mycologia 53: 437—438. 1961; Moldenke, Phytologia 7: 345—350. 1961; Moldenke, Biol. Abstr. 36: 2311. 1961; Runner, Rep. G. W. Groff Coll. 362. 1961; Angely, Fl. Paran. 17: 46. 1961; Angely, Fl. Bacia Paran. 22: 39. 1962; Nair & Rehman, Bull. Bot. Gard. Lucknow 76: 3. 1962; Moldenke, Biol. Abstr. 39: 614. 1962; Soukup, Biota 4: 123—124 (1962) and 4: 366. 1963; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; Erdtman in Preston,

- Adv. Bot. Res. 149--208. 1963; Hocking, Excerpt. Bot. A.6: 532 & 535. 1963; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 395, 535, & 558. 1963; J. K. Maheshwari, Fl. Delhi 276 & 279. 1963; Quezel & Santa, Nouv. Fl. Alg. 2: 779 & 781. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; Santapau & Wagh, Bull. Bot. Surv. India 5: 108. 1963; Angely, Bibl. Veg. Paran. 195. 1964; R. Good, Geogr. Flow. Pl. 440. 1964; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 437. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 208, 335, 517, & 1010. 1964; Puri, Jain, Mukerjee, Sarup, & Kotwal, Rec. Bot. Surv. India 19: 107. 1964; C. M. Rowell, Sida 1: 268. 1964; Santapau, Excerpt. Bot. A.7: 16. 1964; W. T. Stearn, System. Assoc. Publ. 6: 84. 1964; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 2, 241. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1255--1256. 1964; Moldenke, Résumé Suppl. 11: 6 (1964) and 12: 3, 5, & 9. 1965; Angely, Fl. Anal. Paran., ed. 1, 577. 1965; F. A. Barkley, List Ord. Fam. Anthoph. 75, 446, & 158. 1965; Gooding, Loveless, & Proctor, Fl. Barbados 353, 355--356, & 466. 1965; Liogier, Rhodora 67: 349--350. 1965; Moldenke, Phytologia 12: 6. 1965; Rambo, Pesquis. Bot. 21: 13, 14, & [59]. 1965; Airy-Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 150, 163, 664, & 896. 1966; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448 & 449, fig. 256 C & D. 1966; Hirata, Host Range & Geogr. Distrib. Powd. Mild. 276. 1966; Jafri, Fl. Karachi 286 & 287, fig. 282. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 210. 1966; J. K. Maheshwari, Illustr. Fl. Delhi 172. 1966; Rzedowski & McVaugh, Contrib. Univ. Mich. Herb. 9: 107. 1966; W. T. Stearn, Botan. Latin 292 & 297. 1966; Hocking, Excerpt. Bot. A.11: 503. 1967; Moldenke, Résumé Suppl. 15: 2, 3, & 16. 1967; Puig, Bull. Soc. Hist. Nat. Toulouse 103: 309. 1967; Sladkov, Introd. Sporopoll. Analys. 1967; Burlage, Ind. Pl. Tex. 182 & 193. 1968; Moldenke, Biol. Abstr. 49: 4199. 1968; Moldenke, Résumé Suppl. 16: 5, 16, & 28 (1968) and 17: 8. 1968; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: xii & 8. 1969; Anon., Torr. Bot. Club Ind. Am. Bot. Lit. 3: 304 & 309. 1969; Bolkh., Grif, Mayvej., & Zakhar., Chrom. Numb. Flow. Pl. 714. 1969; M. Martinez, Pl. Med. Mex., ed. 5, 505. 1969; Moldenke, Phytologia 18: 504. 1969; A. L. Moldenke, Phytologia 18: 113--114. 1969; Quezel, Fl. & Veg. Plat. Darfur [Doss. 5 Rscherch. Coop. Prog. 45:] 131. 1969; Rickett, Wild Fls. U. S. 3 (2): 362 & 366. 1969; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 325 & 326. 1969; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 2: xxx. 1970; Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1807 & 1871. 1970; El-Gazzar & Wats., New Phytol. 69: 457, 469, 471, 473, 477, 483, & 485. 1970; Gibson, Fieldiana Bot. 24 (9): 168 & 179--182, fig. 33. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1313 & 1335--1336. 1970; Oberwinkler, Pterid. & Sperm. Venez. 12 & 78. 1970; Reitz, Sellowia 22: 22. 1970; Rickett, Wild Fls. U. S. 4 (3): 542 & 765. 1970; Soukup, Raymondiana 3: 26 & 43. 1970; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: iii, 826, & 836--837, map 1388. 1971; Bews in Eyre, World Veget. Types 161. 1971; Dwyer, Raymondiana 4: 70. 1971; Erdtman, Pollen Morph. & Pl. Tax., ed. 3, 448.

1971; Moldenke in Wiggins & Porter, Fl. Galáp. Isls. 500. 1971; Wiggins & Porter, Fl. Galáp. Isls. 980. 1971; C. D. Adams, Flow. Pl. Jam. 626, 631, & 804. 1972; Anon., Biol. Abstr. 54 (4): B. A. S. I. C. S.33. 1972; Cuf., Bull. Jard. Bot. Nat. Belg. 42 (3): Suppl. [Enum. Pl. Aethiop.] 1629. 1972; Moldenke, Biol. Abstr. 54: 1725. 1972; Moldenke, Phytologia 23: 210, 414, 416, 425, & 504. 1972; A. L. Moldenke, Phytologia 23: 318. 1972; J. Mukherjee, Trans. Bose Res. Inst. Calcutta 35: 37--44. 1972; Rouleau, Taxon Index Vol. 1--20 part 1: 54 & 379. 1972; Stafleu, Internat. Code Bot. Nom. 73, 354, & 380. 1972; R. R. Stewart in Nair & Ali, Fl. West Pakist. 605. 1972; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. & Techn. 12 (1): 35. 1972; Whipple, Journ. Elisha Mitch. Sci. Soc. 88: [1], 9, & 13. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): 9 & [62]--63. 1973; Moldenke, Phytologia 25: 236 & 504 (1973) and 26: 500. 1973; Anon., Biol. Abstr. 57 (12): B.A.S.I.C. E.34. 1974; Hocking, Excerpt. Bot. A. 23: 290. 1974; "H. R.", Biol. Abstr. 57: 6940. 1974; Moldenke, Phytologia 28: 507. 1974; Troncoso, Darwiniana 18: 296, 301, 302, 305, 348--350, 408, 411, & 412, fig. 13. 1974.

Airy-Shaw (1966) avers that the Buchia D. Dietr., Syn. Pl. 3: 370--371 (1843) is a synonym of Bouchea Cham. In this disposition he is obviously following Jackson in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 349 (1893). However, it appears evident that the Buchia attributed to Dietrich is identical with the Buchia H.B.K. (1817) referred to by Dietrich and which Jackson on the same page of his work reduces to synonymy under Perama Aubl. in the Rubiaceae. The description is "Cal. bipartitus, laciniis acuminatis carinato-concavis. Cor. basi extus pilis seriatis cincta infundibuliformis 4-partita. Ovarium depresso-globosum. Stigma 3-partitum laciniis capillaribus. Fructus 3-cuspidatus 3-ocularis." It seems unquestionable that both names belong in the synonymy of Perama, not Bouchea.

Barkley (1965) lists Denisia among the valid genera of Verbenaceae, although he also correctly lists it among the synonyms of Bouchea, where, in my opinion, it belongs. Chascanum E. Mey, often listed in the synonymy of Bouchea, is a valid separate genus and Pleurostigma Hochst. and Plexipus Raf. belong in its synonymy.

According to Rickett & Stafleu (1960), the generic name Bouchea has been conserved under the International Code of Botanical Nomenclature as follows: "¶ 7148. Bouchea Chamisso, Linnaea 7: 252. 1832", typified by B. pseudogervao (A. Saint-Hilaire) Chamisso (Verbena pseudogervao A. Saint-Hilaire) (typ. cons.)."

Nair & Rehman (1962) say that "It is known that in Bouchea, there are either 3-porate or 3-colpate grains on which basis the genus could be divided into two groups (Erdtman, 1945). But the Indian species of Bouchea have shown a 3-colporate condition as different from earlier reports." Actually, there are no true members of the genus Bouchea native to India -- the plants referred to by Nair & Rehmann are probably Chascanum marrubifolium Fenzl and

Svensonia hyderbadensis (Walp.) Moldenke, and I am not at all surprised to learn that the pollen grains are distinct.

The late Dr. Gunnar Erdtman, in a letter to me dated December 21, 1972, says "I am writing a short critical note on the (very abundant?) occurrence of Bouchea (maybe several species) similar to or, amazingly enough, almost identical with recent taxa in Late Cretaceous deposits in northeastern Brazil. Can you possibly drop me a line on your opinion in this matter? I consider my opinion (i.e. the determination of the fossil remains) as perfectly safe. What about paleoecology? What about connections betw. America, Africa, Madagascar and India? (Bouchea & Chascamum)." In a following letter, received by me on January 20, 1973, he says "Thank you so very much indeed for your very kind and prompt answer to my letter of December 21st. Bouchea seems to be a very interesting genus for several reasons and I would like to have a young palynologist making a detailed study of it before the publication of any data on its geologic history. B. linifolia, prismatica, pseudogervae, rusbyi etc. seem to be particularly interesting."

It should be noted here that Merrill (1949) and Airy Shaw (1966) erroneously reduce the genus Lomake Raf. to synonymy under Stachytarpheta Vahl -- it definitely belongs in the synonymy of Bouchea.

Soukup (1963) records the vernacular name "pacunga" as applied to a species of Bouchea in Peru [probably B. fluminensis (Vell.) Moldenke].

The Angely (1971) work referred to in the above bibliography bears the date "1970" on its title-page, but was not actually published until 1971. It is also worth noting here that the Schauer (1847) reference from Linnaea was published in August of 1847, while his generally quoted work in De Candolle's Prodrômus did not appear until November 26 of that year. The Index Kewensis uses the latter work as the original place of publication of the several new binomials published by Schauer in the Linnaea work. I am informed that this will be corrected in the next Index Kewensis Supplement.

Gibson (1970) makes the curious statement of the genus Bouchea: "Ten species, one in Abyssinia, the others found in tropical America". She does not indicate what the Abyssinian species is. Actually the genus is confined entirely to the New World. The Ethiopian species which formerly were placed in Bouchea are now regarded as Chascamum (4 species) and Svensonia (2 species). She lists only B. nelsonii, B. prismatica, B. prismatica var. brevirostra, and B. prismatica var. longirostra from Central America. Standley (1938) says "The genus Bouchea is represented in Central America, and perhaps in Costa Rica." Seven species and varieties occur in Mexico; the only one known to me from Costa Rica is B. nelsonii. Sanchez Sanchez (1969) says "Este género comprende unas 17 especies en América tropical y subtropical" -- actually 16 species and 7 named varieties and forms are now recognized. Martínez (1969) notes for an unidentified species from Veracruz

the following information: "Bouchea sp. Tierra Blanca, Ver. El cocimiento de las hojas se usa contra la diarrea." Tharp (1939) comments that some unidentified members of this genus in Texas [there are 3 in the state] are found "in mesquite chaparral and sotol-lechuguilla regions."

The "Bouchea sp." recorded by Robinson & Greenman (1895) is actually Stachytarpheta cayennensis (L. C. Rich.) Vahl. The Breedlove 10268, distributed as Bouchea sp., is actually Ghinia curassavica (L.) Millsp., Stuessey 1031 is Priva grandiflora (Ort.) Moldenke, and C. C. Albers 62122 is not verbenaceous.

BOUCHEA AGRESTIS Schau.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 327 (1893), pr. 2, 1: 327 (1946), and pr. 3, 1: 327. 1960; Moldenke, Phytologia 7: 346. 1961; Moldenke, Résumé Suppl. 12: 3. 1965; Moldenke, Fifth Summ. 1: 147 & 399 (1971) and 2: 768 & 850. 1971.

Two cotype specimens, Blanchet 3731 and 3907, deposited in the herbarium of the Conservatoire et Jardin Botaniques at Geneva, were photographed there by Macbride as his type photograph number 7851.

Additional & emended citations: BRAZIL: Bahia: Blanchet 3731 [Macbride photos 7851, in part] (E—134933--cotype, W--photo of cotype), 3907 [Macbride photos 7851, in part] (W--photo of cotype). Maranhão: Eiten & Eiten 4415 (N).

BOUCHEA BOLIVIANA (Kuntze) Moldenke

Additional synonymy: Bouchea pseudogervao f. pilosa Herzog apud R. C. Foster, Contrib. Gray Herb. 184: 169, in syn. 1958. Bouchea boliviana Mold. ex Troncoso, Darwiniana 18: 350. 1974.

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 39. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569. 1941; Moldenke, Phytologia 4: 488--489. 1954; R. C. Foster, Contrib. Gray Herb. 184: 169. 1958; Moldenke, Résumé 113, 123, 239, 347, 356, & 443. 1959; Moldenke, Fifth Summ. 1: 181, 195, & 400 (1971) and 2: 628, 646, & 850. 1971; Moldenke, Phytologia 28: 441 & 953. 1974; Troncoso, Darwiniana 18: 350. 1974.

Recent collectors describe this plant as herbaceous, 1 m. tall, frequent in wet soil "en seja de monte", and have found it growing at 400 m. altitude, blooming in March. The corollas on R. F. Steinbach 789 are described as having been "violet" in color when fresh.

Troncoso (1974) cites Burkart & al. s.n. [Ledesma; Herb. Inst. Darwinion 15244] from Jujuy and Rodríguez 174 from Salta, Argentina, in the Darwinion herbarium.

Additional & emended citations: BOLIVIA: Santa Cruz: R. F. Steinbach 789 (N, S, W—2533570, Ws). Tarija: Pflanz 2037 (W—1234317).

BOUCHEA BOYACANA Moldenke

Additional bibliography: Moldenke, *Phytologia* 7: 346 (1961) and 13: 242. 1966; Hocking, *Excerpt. Bot. A.11*: 503. 1967; Moldenke, *Biol. Abstr.* 49: 4199. 1968; Moldenke, *Fifth Summ.* 1: 115 (1971) and 2: 850. 1971; Moldenke, *Phytologia* 28: 434. 1974.

BOUCHEA BOYACANA var. GLAERATA Moldenke

Bibliography: Moldenke, *Phytologia* 13: 242. 1966; Hocking, *Excerpt. Bot. A.11*: 503. 1967; Moldenke, *Biol. Abstr.* 49: 4199. 1968; Moldenke, *Fifth Summ.* 1: 139 (1971) and 2: 850. 1971.

Material of this taxon has been misidentified and distributed in some herbaria as *B. fluminensis* (Vell.) Moldenke.

Citations: PERU: Piura: Hutchison & Wright 6592 (W--2467554--isotype, Z--type).

BOUCHEA CHASCANOIDES Moldenke

Additional bibliography: Moldenke, *Phytologia* 7: 346. 1961; Moldenke, *Fifth Summ.* 1: 147 (1971) and 2: 850. 1971.

BOUCHEA CIPOENSIS Moldenke

Synonymy: *Bouchea cipensis* Moldenke ex Renn6, *Levant. Herb. Inst. Agron. Minas* 149. 1960.

Additional bibliography: Renn6, *Levant. Herb. Inst. Agron. Minas* 149. 1960; Moldenke, *Phytologia* 7: 346--347. 1961; Moldenke, *Fifth Summ.* 1: 147 & 399 (1971) and 2: 850. 1971.

BOUCHEA DISSECTA S. Wats.

Additional synonymy: *Bouchea dessecta* S. Wats. ex Moldenke, *Phytologia* 28: 453, in syn. 1974.

Additional & emended bibliography: Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 1, 61 (1921) and pr. 2, 61. 1941; Moldenke, *Phytologia* 4: 489--490. 1954; Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 3, 61. 1959; Moldenke, *Résumé* 34, 238, 239, & 443. 1959; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1256. 1964; Langman, *Select. Guide Lit. Flow. Pl. Mex.* 335. 1964; Moldenke, *Fifth Summ.* 1: 67, 399, & 400 (1971) and 2: 850. 1971; Moldenke, *Phytologia* 28: 453. 1974.

In Shreve & Wiggins (1964) the distribution of this species is given as "In shade on llanos, in pebbly, slightly red soil and fields, and on rocky ridges, ledges, and hill slopes, Lower Sonoran to Tropical Zones, central Sonora to Guerrero". Gentry found it on an open slope with turf grass and thin arid soil in the Lowland Forest Area, at 1500 feet altitude, and notes "the corollas falling before midday". Other recent collectors have found the species in fields, on dry llanos, on hillsides with dense shrubs and woods, and "occasional" on wooded bluffs with *Cordia*, *Acacia*, and *Lysiloma tergemina*.

The corollas are described as having been "pink" on Hinton 6492, 12019, & 12114, "bright pink" on H. S. Gentry 6133, "laven-der-pink" on Dieterle 4317, and "purple" on McVaugh 17993. The plant has been found in fruit in September. Hinton, on the label

of his no. 6492, says of it "very rare; a new record".

Still other recent collectors have encountered B. dissecta in fields and on forested slopes with Bursera, Pseudobombax, Ipomoea, and Guazuma, while Dieterle refers to it as an "occasional herb in the shade of shrubs in cultivated land with remnants of thorn forest and areas of old lava flows".

Additional & emended citations: MEXICO: Guerrero: Hinton & al. 6492 (Ld, Se—103432, Tu—112028). Michoacán: Dieterle 4317 (Mi); Hinton & al. 12019 (Ld, Se—103433, Tu—112029), 12062 (Mi, S), 12114 (Ld, Mi, Se—103341, Tu—112030); McVaugh 17993 (Mi). Sinaloa: T. S. Brandegee s.n. [Culiacan] (Ca—104993, W—873656); Breedlove & Thorne 17986 (Gg—532706); H. S. Gentry 6133 (Du—319742, Tu—124391); J. Gonzalez Ortega 621 (W—1083758), 681 (F—598077); Nervaez Montes & Salazar 621 (W—1039133); Edw. Palmer 1485 (W—305276); Waterfall 12757 (St, Z). Sonora: M. E. Jones 22361 (E—969938); Edw. Palmer 259 (W—46708—isotype), B (W—208736); I. L. Wiggins 7292 (Ca—665313, Ld, Se—168355, Tu—98486).

BOUCHEA FLABELLIFORMIS M. E. Jones

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 39. 1938; Moldenke, Phytologia 4: 490. 1954; Moldenke, Résumé 34 & 443. 1959; Moldenke, Fifth Summ. 1: 67 (1971) and 2: 850. 1971.

Emended citations: MEXICO: Baja California: M. E. Jones 27439 (E—1034293—isotype, F—721365—isotype).

BOUCHEA FLUMINENSIS (Vell.) Moldenke

Additional & emended synonymy: Verbena fluminensis Arrab. ex Steud., Nom. Bot., ed. 2, 750. 1841. Verbena pseudo-gervao A. St.-Hil. ex Steud., Nom. Bot., ed. 2, 2: 750, in syn. 1841. Bouchea pseudogervao Cham. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 1179. 1895. Bouchea pseudogervao Cham. ex M. Kunz, Anatom. Untersuch. Verb. 40. 1911. Verbena fluminensis (Vell.) Moldenke, Résumé Suppl. 16: 28, in syn. 1968. Bouchea fluminensis Vell. ex Moldenke, Fifth Summ. 1: 399, in syn. 1971. Bouchea fluminensis Mold. ex Moldenke, Phytologia 25: 236, in syn. 1973.

Additional & emended bibliography: Cham., Linnaea 7: 252—254. 1832; Steud., Nom. Bot., ed. 2, 2: 750. 1841; Bocq., Adansonia, ser. 1, 3: [Rev. Verbénac.] 237. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 327 (1893) and pr. 1, 2: 1179. 1895; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 466. 1904; M. Kunz, Anatom. Untersuch. Verb. 40. 1911; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366]. 1932; Moldenke, Carnegie Inst. Wash. Publ. 522: 176. 1940; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 327 (1946) and pr. 2, 2: 1179. 1946; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 1, 1: 302. 1951; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448. 1952; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 2, 1: 302. 1956; Rambo, Sellowia 7: 207. 1956; Angely, Fl.

Paran. 7: 11. 1957; Schnack & Fehleisen, Darwiniana 11: 245--255. 1957; Cave, Ind. Pl. Chromosome Nos. 1: vi & 53. 1958; R. C. Foster, Contrib. Gray Herb. 184: 169. 1958; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 327 (1960) and pr. 3, 2: 1179. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 656--657. 1960; Renné, Levant. Herb. Inst. Agron. Minas 149. 1960; Rambo, Pesquis. Bot. 4: 18 (1960) and 12: 21. 1961; Angely, Fl. Paran. 17: 46. 1961; Soukup, Biota 4: 124. 1962; Hocking, Excerpt. Bot. A.6: 535. 1963; Angely, Bibl. Veg. Paran. 195. 1964; Moldenke, Résumé Suppl. 11: 6 (1964) and 12: 3 & 5. 1965; Angely, Fl. Anal. Paran., ed. 1, 577. 1965; Rambo, Pesquis. Bot. 21: 13--14 & [59]. 1965; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448. 1966; Moldenke, Résumé Suppl. 16: 28. 1968; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: xli. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl. 714. 1969; Reitz, Sellowia 22: 22. 1970; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: 837, iii, & xix, map 1388. 1971; Dwyer, Raymondiana 4: 70. 1971; Erdtman, Pollen Morph. & Pl. Tax., ed. 3, 448. 1971; Moldenke, Fifth Summ. 1: 135, 139, 147, 181, 188, 195, 355, & 399--401 (1971) and 2: 628--631, 668, 680, 691, 768, & 850. 1971; Rouleau, Taxon Index Vol. 1-20 part 1: 54 & 379. 1972; Stafleu, Internat. Code Bot. Nom. 354. 1972; Moldenke, Phytologia 23: 425 (1972) and 25: 236. 1973; Troncoso, Darwiniana 18: 348--350, 411, & 412, fig. 12. 1974.

Additional illustrations: Troncoso, Darwiniana 18: 349, fig. 12. 1974.

Recent collectors describe this plant as an herb, subshrub, or open irregularly branched shrub, 1--1.5 m. tall, the leaves grayish-green, glabrous, and soft, the flowers slightly zygomorphic, and found it growing in open places, gallery forests, capoeira at the edge of streams, partial shade on wooded calcareous outcrops, and in semi-arid cactus-Acacia forests, at altitudes of 800--1200 m., flowering in March and from May to December, and fruiting in March, May, and October.

Hatschbach describes the species as "ruderal", while Macbride (1960) actually makes the amazing statement that "Too many collections have been made of this weedy plant". Actually, not intensive enough collecting of it has been done as yet in order to determine more accurately the distribution of its several names (and perhaps other as yet unnamed) subspecific taxa. Macbride also notes that correspondence between Saint-Hilaire and Kunth, from which I have quoted in a previous work (1940), "shows, interestingly, that the observing and extremely able French botanist [Saint-Hilaire] was deterred by his friend [Kunth] from proposing a new genus based on his V[erben]a pseudogervao, six years before Chamisso's segregation was published." Stafleu (1972) informs us that Bouchea pseudogervao (A. St.-Hil.) Cham. is the conserved type ["type cons."] for the genus Bouchea.

The corollas are described as having been "blue" on Hatschbach 32635 and Sehnm 4071, "purple" on Woytkowski 5801, "blue to purple" on Ferreya 17429, "lilac" on Krapovickas, Cristóbal, & Maruñak 15778, "violet" on Hatschbach 28462, "pale rosy-lavender"

on Irwin, Maxwell, & Wasshausen 21013, and "light-violet, the tube paler" on Irwin, Souza, Grear, & Reis dos Santos 15702, while on Madison 10447-70 it is stated that the calyx was "light-green, corolla-tube white, the lobes lavender, the anthers bright-yellow!"

Erdtman (1966) has examined the pollen of Widgren 344 from Brazil and describes the grains as more or less like those seen in B. prismatica (L.) Kuntze, but slightly smaller, being 121 μ x 77 μ in dimensions. Soukup (1962) records the vernacular names "pacunga" and "pacungua" for B. fluminensis in Peru. Cave (1958) reports the haploid chromosome number as 20. Peckolt (1904) says "In den Staaten vom Äquator bis zur südlichen Tropenzone bekannt als Gervao de folha grande — Groszblätteriger G[ervao]. Diese Pflanze wird als Ersatz der folgenden [Stachytarpheta dichotoma (Ruiz & Pav.) Vahl] genommen, doch nicht so geschätzt."

A cotype specimen of Verbena pseudogervao, A. Saint-Hilaire 497, was photographed in the herbarium of the Botanischer Garten und Museum at Berlin by Macbride as his type photograph number 17583, but is now destroyed, and a specimen of Reineck s.n. in the same herbarium is his type photograph number 17604 [although it is not a type number of anything] and is also now destroyed.

Chittenden (1956) describes B. fluminensis as an "Evergreen perennial. Stems 4-angled, 2 to 5 ft. h[igh]", the leaves "ovate or elliptic-ovate, slender-pointed, toothed", the flowers [corollas] "purplish with white throat, in terminal spikes, 6 to 10 in. long, slender", flowering in September [in England]. He says that it was introduced into cultivation in England from Brazil in 1874 and should be grown there in the "Stove". "A well-drained compost or loam and sandy peat suits them. Propagated by cuttings taken in spring, placed in sand under a hand-glass in gentle heat." The Ledingham 4439, cultivated in Argentina, is said to have come originally from Misiones.

Rambo (1965) cites the following Herb. Anchieta numbers, all collected by himself except where otherwise noted: 1135, 2749, 9496, 30646, 35480 [Henz s.n.], 37900, 38378, 42431, 42763, 42903, 42950, 43792, 44756, 47069, 47761 [Sehnm 4056], 47762 [Sehnm 4071], 47763 [Sehnm 3819], 48734, 48893, 49118, 50473 [Sehnm 4056], and 52259 [Spies s.n.] from Rio Grande do Sul, 30453 [Reitz 995] and 32076 from Santa Catarina, and 35821 [Hatschbach 745] and 53477 from Paraná, Brazil. The 47761 [Sehnm 4056], however, has been examined by me and proves actually to be f. albiflora Moldenke.

Macbride (1960) cites from Peru: Cuzco: Diehl 2429, Soukup 800. Junín: Killip & Smith 26625, Klug 2839, Macbride 5304. San Martín: Goodspeed 35004 & 35105, Klug 3904 & 4206, Ll. Williams 5469, 5561, & 5808, Woytkowski 35004. He records the vernacular names "pacunga" and "pakungua" and gives the extra-limital distribution of the species as "Ecuador and Brazil".

Troncoso (1974) cites Rojas s.n. [Puerto Aguirre; Herb. Osten

8074] and Schnack s.n. [Iguazú; Herb. Inst. Darwin. 19855] from Misiones, Argentina, the former deposited in the herbarium of the Museo de Historia Natural in Montevideo and the latter in the Darwinion herbarium, and Ule 3886 from Santa Catarina, Brazil, in the Hamburg herbarium.

Dwyer (1971) cites Woytkowski 5728 from Cajamarca, Peru, 5801 from Junín, and 7152 from San Martín.

Material of this species has been misidentified and distributed in some herbaria as B. ehrenbergii Cham. and as something in the Acanthaceae or Gesneriaceae. On the other hand, the Hutchison & Wright 6592, distributed as B. fluminensis, is actually the type collection of B. boyacana var. glabrata Moldenke, while Eggers 14618 is Stachytarpheta cayennensis (L. C. Rich.) Vahl.

Additional & emended citations: ECUADOR: Manabí: Anthony & Tate 87 (W—1192177). PERU: Cajamarca: Woytkowski 5728 (W—2397000). Cuzco: Diehl 2429 (F—630092). Junín: Killip & Smith 23397 (W—1358097), 25023 (W—1359316), 26625 (W—1460508); Macbride 5304 (F—536329, W—1515778); M. T. Madison 10447-70 (F—1728084); Woytkowski 5801 (W—2397040). Loreto: Klug 2839 (W—1065412); Spruce 4528 (V—294397). San Martín: Ferreira 17429 (W—2552872); Klug 3904 (E—1104925); L. Williams 5469 (F—626650), 5561 (F—623226), 5808 (F—626486, W—1496555). BRAZIL: Acre: Ule 9725 (Ut—49204, W—1615224). Distrito Federal: Irwin, Maxwell, & Wasshausen 21013 (Ld). Goiás: Irwin, Souza, Grear, & Reis dos Santos 15702 (Ac). Guanabara: N. Santos 5425 (Ja). Minas Gerais: Mexia 5268 (Au—120850, F—866392, Go, Mi); Regnell 1.340 [1856] (W—209654); A. Saint-Hilaire 947 [Macbride photos 17583] (E—663062—photo, E—914102—photo, N—photo, W—photo); Widgren s.n. [Caldas, 13/4/1846] (W—1323026). Paraná: Dusén 7567 (W—1481823), 9504 (D—683010, E—1035819, F—668416, W—1481824); Hatschbach 28462 (Ld), 32635 (Ld). Rio de Janeiro: Aguillar s.n. [Estação Experimental, 2 Nov. 1922] (Ja—45980, Ja); A. Lutz 23668 (F—656559). Rio Grande do Sul: Leite 2025 (G); Rambo Herb. Anchieta 48893 (W—2047022), 49118 (Du—376556, Go); Reinck s.n. [Macbride photos 17604] (W—photo); Sehnem 4071 [Herb. Anchieta 47762] (B). Santa Catarina: Reitz & Klein 2626 (W—2340820). BOLIVIA: El Beni: H. H. Rusby 915 (Du—382293, E—118620, V—928, W—32698, W—1323027). La Paz: Krukoff 10461 (W—1778164). ARGENTINA: Corrientes: Pedersen 2914 (W—2283157). Misiones: Krapovickas, Cristóbal, & Maruffak 15778 (Ld). CULTIVATED: Argentina: Ledingham 1439 (N).

BOUCHEA FLUMINENSIS f. ALBIFLORA Moldenke

Bibliography: Moldenke, *Phytologia* 8: 273. 1962; Moldenke, *Biol. Abstr.* 39: 614. 1962; Moldenke, *Résumé Suppl.* 4: 5. 1962; Hocking, *Excerpt. Bot. A.6*: 535. 1963; Moldenke, *Fifth Summ.* 1: 147 (1971) and 2: 850. 1971.

Citations: BRAZIL: Rio Grande do Sul: Sehnem 4056 [Herb. Anchieta 47761] (B--type).

BOUCHEA FLUMINENSIS var. PILOSA Moldenke

Additional bibliography: Angely, Fl. Paran. 7: 11 (1957) and 17: 46. 1961; Moldenke, Phytologia 7: 348. 1961; Angely, Bibl. Veg. Paran. 195. 1964; Angely, Fl. Anal. Paran., ed. 1, 577. 1965; Moldenke, Fifth Summ. 1: 147 & 195 (1971) and 2: 850. 1971.

Recent collectors have found this plant growing in forests, woods, and pastures, at 200--300 m. altitude, flowering in May, October, and December, and fruiting in December. They describe it as a subshrub, 70 cm. tall. The corollas are said to have been "lilac" in color when fresh on Hatschbach 29683 and this collection was made on the banks of an "areia".

Additional citations: BRAZIL: Paraná: Hatschbach 29683 (Id). Santa Catarina: Smith & Klein 14100 (N, Z); Smith & Reitz 12670 (W--2451606).

BOUCHEA INOPINATA Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 39. 1938; Moldenke, Phytologia 4: 493--494. 1954; Moldenke, Résumé 87 & 443. 1959; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 850. 1971.

The type specimen, Schüch s.n., in the herbarium of the Naturhistorisches Museum in Vienna, was photographed there by Macbride as his type photograph number 34325.

Additional citations: BRAZIL: State undetermined: Schüch s.n. [Macbride photos 34325] (W--photo of type).

BOUCHEA LINIFOLIA A. Gray

Additional synonymy: Bouchea linitolia A. Gray ex Moldenke, Résumé Suppl. 6: 0, in syn. 1963.

Additional & emended bibliography: A. Gray, Syn. Fl. N. Am., ed. 1, 2 (1): 335 (1878) and ed. 2, 2 (1): 335. 1886; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 327 (1893) and pr. 2, 1: 327. 1946; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448 & 449, fig. 256 C. 1952; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 327. 1960; Moldenke, Phytologia 7: 348 (1961) and 9: 165. 1963; Moldenke, Résumé Suppl. 6: 9. 1963; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448 & 449, fig. 256 C. 1966; Rickett, Wild Fls. U. S. 3 (2): 366. 1969; Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1807. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1336. 1970; Erdtman, Pollen Morph. & Pl. Tax., ed. 3, 448 & 449, fig. 256 C. 1971; Moldenke, Fifth Summ. 1: 54, 61, 67, & 400 (1971) and 2: 850. 1971.

Additional illustrations: Erdtman, Pollen Morph. & Pl. Tax., ed. 1, fig. 256 C (1952), ed. 2, fig. 256 C (1966), and ed. 3, fig. 256 C. 1971.

Recent collectors describe this plant as an erect shrub, 1--3 feet tall, or an "infrequent perennial", with large showy flowers,

growing on limestone hills, in limestone crevices, on open, dry, rocky or dry calcareous hillsides, in small rocky canyons, and "along permanent streams of water", at 1100--3800 feet altitude, flowering in April and from June to October, and fruiting from June to October. Warnock & McBryde describe it as "infrequent" in Val Verde County, Texas, but R. M. Stewart asserts that it is "fairly common" or "common" in Coahuila, Mexico.

The corollas are described as having been "lavender" when fresh on Warnock 13334 and on Warnock & McBryde 15100, "purple" on R. M. Stewart 1611, and "magenta" on Johnston & Mueller 342.

Erdtman (1966) examined the pollen from Wynd & Mueller 409 and describes the grains as 4--5-colpate, subprolate, and $76\ \mu \times 65\ \mu$ in size.

The Sperry T.125 & T.563, distributed as B. linifolia, are actually Verbena perennis Wooton.

Additional & emended citations: TEXAS: Brewster Co.: Havard s. n. [W. of Taelingra] (F--252020). Kinney Co.: Havard 1383 (E--118634, F--252147, W--155945). Pecos Co.: Flyr 199 (Au--235324); B. H. Warnock 13334 (Ld). Presidio Co.: Tharp 253 (Ca--882436). Terrell Co.: B. H. Warnock 14001 (Ld). Uvalde Co.: E. J. Palmer 13007 (Au, Ca--425600, E--827557, Tu--69660). Val Verde Co.: G. L. Fisher 49109 (Ew); Schott s.n. [Emory 814] (W--43500); B. H. Warnock 11170 (Ld), 11289 (Ld); Warnock & McBryde 15100 (Au, Ld); C. Wright 449 (Ca--221687--cotype, W--43509--cotype), 1509 (E--118619--cotype, W--113510--cotype). MEXICO: Coahuila: Gould 10605 (Au--236394); Johnston & Mueller 342 (Au--299425); E. G. Marsh 1383 (Au, St); R. M. Stewart 645 (Au--301294), 1611 (Au--300789); Wynd & Mueller 409 (E--1114105, Mi, St).

BOUCHEA NELSONII Grenz.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366]. 1932; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746. 1934; Moldenke, Phytologia 7: 348. 1961; Langman, Select. Guide Lit. Flow. Pl. Mex. 335 & 1010. 1964; Moldenke, Résumé Suppl. 15: 3. 1967; Gibson, Fieldiana Bot. 24 (9): 179--181, fig. 33. 1970; Moldenke, Fifth Summ. 1: 67, 78, 87, & 400 (1971) and 2: 850. 1971; Moldenke, Phytologia 23: 414 & 416. 1972.

Illustrations: Gibson, Fieldiana Bot. 24 (9): 181, fig. 33. 1970.

Recent collectors describe this plant as herbaceous, 60 cm. tall, with flowers 1/4 inch long, and have found it growing on limestone hillsides, on road shoulders, in chaparral, on slopes, in matorral vegetation in canyons, and on wet alluvium at small streamsides, at altitudes of 14--1100 m. Tapia encountered it on "ladera granítica con vegetación de bosque tropical decidua", while Ventura A. refers to it as "scarce" or "rare".

The corollas are described as having been "lavender" when fresh on R. M. King 877, "pink" on Breedlove 6303 and Hinton 10862, "blue" on Laughlin 2617, "light-blue" on Pfeifer 1613,

"purple" on Tapia s.n. and Ventura A. 2646, and "light red-violet" on Moldenke & Moldenke 2285.

King describes this species as "common", growing in open sun on clay-loam of flat grazed areas with the vegetation consisting mainly of cacti and leguminous shrubs. Gibson (1970) gives its distribution as "Brushy, rocky slopes or plains, 150—800 meters; Huchuetenango; Zacapa [Guatemala]. Mexico (Oaxaca and Chiapas); Honduras" and reports the vernacular name "verbena".

Material of this species has been misidentified and distributed in some herbaria as B. prismatica (L.) Kuntze and as B. prismatica var. longirostra Grenz. On the other hand, the Horton & Morrison 8854, distributed as B. nelsonii, is actually B. prismatica var. longirostra Grenz.

Additional & emended citations: MEXICO: Chiapas: Breedlove 6303 (Ac); Laughlin 2617 (W—2557095); Moldenke & Moldenke 2285 (Ld); E. W. Nelson 2867 (E—923400—photo of type, W—229331—type). Guerrero: Alexander & Hernandez Xolocotzi 111 [E. J. Alexander 2122] (N, N, N, N); Hinton 10862 (Ld, Se—120074); Webster, Rowell, & Barkley 174718 (Au—123230). Oaxaca: E. J. Alexander 272 (N, N, Z); G. L. Fisher 35472 (E—1097034), s.n. (Tu—107930); R. M. King 877 (Mi); Matuda 6119 (Ld); Orcutt 5268 (W—1266957); Tapia s.n. [25/IX/1965] (Ip). Veracruz: Ventura A. 2646 (Au—303155, Mi, N). GUATEMALA: Zacapa: Kellerman 7932 (F—224758, W—2442732), s.n. [Zacapa, 1908] (W—2442663); H. Pittier 1779 (W—578173). HONDURAS: Distrito Central: Pfeifer 1613 (W). COSTA RICA: Guanacaste: A. R. Moldenke 1217 (Ac).

BOUCHEA NOTABILIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 4: 495. 1954; Moldenke, *Résumé* 65 & 443. 1959; Moldenke, *Fifth Summ.* 1: 115 (1971) and 2: 850. 1971.

BOUCHEA PRISMATICA (L.) Kuntze

Additional synonymy: Verbena americana media annua, ocymi folio lanuginoso, flore purpureo amplo Breyn., *Prod. Fasc. Rar. Pl.*, ed. 1, 2: 104. 1688. Verbena americana annua, folio ocymi Breyn., *Prod. Fasc. Rar. Pl.*, ed. 1, 2: 104, in syn. 1688. Verbena scutellariae, s. cassidae folio, dispermos, americana, an Verbena indica Bontii. *Hist. Ind. Or. forte etiam Verbena curassavica scutellariae foliis, flore purpurascens* Pluk., *Phytogr.* 1: pl. 70, fig. 1. 1691. Verbena minima chamaedryos folio Sloane, *Cat. Pl. Ins. Jamaic.* 64. 1696. Verbena americana media annua ocimi folio lanuginoso, flore purpureo amplo Breyn. apud Moris., *Pl. Hist. Univ. Oxon.* 3: 418 ["408"]. 1699. Verbena curassavica scutellariae foliis, flore purpurascens Herm. ex Moris., *Pl. Hist. Univ. Oxon.* 3: 418 ["408"], in syn. 1699. Verbena americana media annua, ocimifolio lanuginoso, flore purpureo amplo Breyn. apud Ray, *Hist. Plant.* 3: Suppl. 285.

1704. Verbena scutellariae sive cassidae folio dispermos Pluk. apud Ray, Hist. Plant. 3: Suppl. 285, in syn. 1704. Verbena scutellariae foliis dispermos americana Pluk. ex Herm., Cat. Plant. Nond. 13 & 15. 1905. Verbena americana media annua, ocymi folio lanuginoso, flore purpureo amplo Breyn., Prod. 2: 104. 1739. Verbena erecta divisa, spicis e divaricationibus supremis assurgentibus Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 115. 1755. Verbena folio subrotundo serrato, flore caeruleo Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 116, in syn. 1755. Verbena scutellariae sive cassidae folio, &c. Pluk. ex Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 116, in syn. 1755. Verbena diandra, spic. laxis, calyc. alternis prismaticis truncatis aristatis, fol. ovatis obtusis J. A. Murr. in L., Syst. Veg., ed. 13, 62. 1774. Verbena diandra, spicis laxis, calycib. alternis prismaticis truncatis aristatis, fol. ovatis obtusis L. apud H. E. Richter, Cod. Bot. Linn. 35. 1835. Verbena minima, chamaedryos fol. Sloane apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena, scutellariae s. cassidae fol., dispermos americ. Pluk. apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena minima, chamaedr. fol. Sloane apud Peterm., Cod. Bot. Linn. Ind. Alph. 196, in syn. 1840. Verbena scutellariae s. cassid. fol. etc. Pluk. apud Peterm., Cod. Bot. Linn. Ind. Alph. 196, in syn. 1840. Stachytarpheta prismatica Vahl ex Voigt, Hort. Suburb. Calc. 473. 1845. Bouchéa ehrenbergiana Cham. ex Schau., Linnaea 20: 478. 1847. Bouchea prismatica Briq. ex Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 61, in syn. 1901. Bouchea prismatica Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 61, in syn. 1901. Callicarpa prismatica Robledo, Lecc. Bot. 2: 498. 1940. Verbena folio subrotundo serrato flore coerulea Sloane ex Moldenke, Fifth Summ. 2: 670, in syn. 1971. Zapania prismatica Lam. ex Moldenke, Fifth Summ. 2: 737, in syn. 1971.

Additional & emended bibliography: Breyn., Prod. Fasc. Rar. Pl. Secund. 104. 1689; Pluk., Phytogr. 1: pl. 70, fig. 1. 1691; Sloane, Cat. Pl. Ins. Jamaic. 64. 1696; Moris., Pl. Hist. Univ. Oxon. 3: 418 ["408"]. 1699; Ray, Hist. Plant. 3: Suppl. 285--286. 1704; Herm., Cat. Plant. Nond. 13 & 15. 1705; Breyn., Prod. Fasc. Rar. Pl. Prim. & Sec. 2: 104. 1739; Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 115--116. 1755; Crantz, Inst. Rei Herb. 1: 572. 1766; [Retz.], Nom. Bot. 11. 1772; J. A. Murr. in L., Syst. Veg., ed. 13, 62. 1774; Christm. & Panzer, Vollst. Pflanzensyst. Houttuyn 5: 121--122. 1779; Sloane, Civil & Nat. Hist. Jamaic., ed. 2, 115--116. 1789; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 41 (1789) and pr. 2, 2: 41. 1796; Raeusch., Nom. Bot., ed. 3, 3. 1797; Balbis, Cat. Pl. Hort. Taur. 48. 1804; Dum. Cours. Bot. Cult., ed. 2, 2: 624. 1811; Pers., Sp. Pl. 3: 351. 1819; H. E. Richter, Cod. Bot. Linn. 35. 1835; Peterm., Cod. Bot. Linn. Ind. Alph. 196. 1840; Steud., Nom. Bot., ed. 2, 2: 629 & 750. 1841; Voigt, Hort.

Suburb. Calc. 473. 1845; Schau., *Linnaea* 20: 478. 1847; Bocq., *Adansonia*, ser. 1, 3: [Rev. Verbénac.] 237. 1863; Griseb., *Cat. Pl. Cuba* 214. 1866; A. Gray, *Syn. Fl. N. Am.*, ed. 1, 2 (1): 334. 1878; A. S. Hitchc., *Ann. Rep. Mo. Bot. Gard.* 4: 117. 1893; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 1, 1: 327. 1893; Just, *Bot. Jahresber.* 23 (2): 76. 1897; Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 1, 61. 1901; M. Kunz, *Anatom. Untersuch. Verb.* 39. 1911; J. Matsumura, *Ind. Pl. Jap.* 2 (2): 533. 1912; Loes., *Verh. Bot. Ver. Brand.* 53: 79 [Abhandl. 244]. 1912; Britton & P. Wils., *Scient. Surv. Porto Rico* 6: 143. 1925; Wangerin in Just, *Bot. Jahresber.* 54 (1): 1160 [366]. 1932; Fedde & Schust. in Just, *Bot. Jahresber.* 54 (2): 746. 1934; Robledo, *Lecc. Bot.* 2: 498. 1940; Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 2, 61. 1941; Savage, *Cat. Linn. Herb. Lond.* 4. 1945; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 2, 1: 327. 1946; Selling, *Bishop Mus. Spec. Publ.* 38: 274 & 394. 1947; E. D. Merr., *Ind. Raf.* 204. 1949; Kearney, *List Citations Place Publ. Spp. Ariz. Fl.* 19 [thesis]. 1951; Erdtman, *Pollen Morph. & Pl. Tax.*, ed. 1, 448 & 449, fig. 256 D. 1952; Arnoldo, *Zakfl.* 125—126, 154, & 163, pl. 55, fig. 118. 1954; Vélez, *Herb. Angiosp. Lesser Ant.* 116. 1957; Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 3, 61. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 3, 1: 327. 1960; Howell & McClintock in Kearney & Peebles, *Ariz. Fl.*, ed. 2, 730. 1960; Kevorkian, *Phytopath.* 43: 406. 1960; Kevorkian, *Mycologia* 52: 523—524. 1960; J. F. Macbr., *Field Mus. Publ. Bot.* 13 (5): 657. 1960; Kevorkian, *Mycologia* 53: 437—438. 1961; Moldenke, *Phytologia* 7: 348—349. 1961; Langman, *Select. Guide Lit. Flow. Pl. Mex.* 335. 1964; C. M. Rowell, *Sida* 1: 268. 1964; Gooding, Loveless, & Proctor, *Fl. Barbados* 355—356 & 466. 1965; Liogier, *Rhodora* 67: 349—350. 1965; Moldenke, *Résumé Suppl.* 12: 3 & 9. 1965; Erdtman, *Pollen Morph. & Pl. Tax.*, ed. 2, 448 & 449, fig. 256 D. 1966; Hirata, *Host Range & Geogr. Distrib. Powd. Mild.* 276. 1966; Rzedowski & McVaugh, *Contrib. Univ. Mich. Herb.* 9: 107. 1966; Puig, *Bull. Soc. Hist. Nat. Toulouse* 103: 309. 1967; Moldenke, *Résumé Suppl.* 15: 2 (1967) and 16: 5 & 28. 1968; A. L. Moldenke, *Phytologia* 18: 113—114. 1969; Rickett, *Wild Fls. U. S.* 3 (2): 366. 1969; Sanchez Sanchez, *Fl. Val. Mex.*, ed. 1, 326. 1969; Correll & Johnston, *Man. Vasc. Pl. Tex.* [Contrib. Tex. Res. Found. Bot. 6:] 1807. 1970; Gibson, *Fieldiana Bot.* 24 (9): 179, 180, & 182. 1970; Moldenke in Correll & Johnston, *Man. Vasc. Pl. Tex.* [Contrib. Tex. Res. Found. Bot. 6:] 1336. 1970; Oberwinkler, *Pterid. & Sperm. Venez.* 12 & 78. 1970; Rickett, *Wild Fls. U. S.* 4 (3): 543 & 765. 1970; Erdtman, *Pollen Morph. & Pl. Tax.*, ed. 3, 448. 1971; Moldenke, *Fifth Summ.* 1: 62, 67, 78, 82, 85, 93, 94, 100, 102, 104, 106, 108, 112, 113, 115, 122, 135, 147, 355, 398—400, 402, 416, & 475 (1971) and 2: 519, 568, 627, 631, 639, 646, 647, 651, 653, 665, 666, 684, 691, 695, 696, 737, 790, & 851. 1971; C. D. Adams, *Flow. Pl. Jam.* 631, 797, & 846. 1972; Moldenke, *Phytologia* 23: 414. 1972; A. L. Moldenke, *Phytologia* 23: 318. 1972; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 9 (13): [62]—63, fig. 1—12. 1973; Moldenke, *Phytologia* 28: 434, 436, & 464. 1974.

Additional illustrations: Pluk., *Phytogr.* 1: pl. 70, fig. 1.

1691; Erdtman, Svensk Bot. Tidsk. 39: 282, fig. 8. 1945; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 449, fig. 256 D. 1952; Arnoldo, Zakfl. pl. 55, fig. 118. 1954; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 449, fig. 256 D. 1966; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): [62], fig. 1—4. 1973.

Recent collectors describe this plant as an erect annual herb or subshrub ["sufrutice"], unarmed, 15 cm. to 1 m. tall, with zygomorphic flowers, the calyx green, the corolla easily detached, filaments white, anthers yellow, ovary and style light-green, and stigma darker green. Erdtman (1966) describes the pollen grains as 3-colporate, trans- and brevicolpate, the colpi not very distinct, about 4 μ x 27 μ in size, the ora more or less circular, diameter about 27 μ (margins included), prolate, 156 μ x 96 μ overall. He asserts that this is the longest axis of any pollen grains [which he has examined] in the Verbenaceae, Avicenniaceae, Stilbaceae, and Symphoremaceae, and that the grains of B. fluminensis are similar but slightly smaller.

The corollas are described as having been "lavender" when fresh on Laughlin 822 and Lundell & Lundell 7876, "violet" on Daniel 2284 and Hutchison, Idrobo, & Wright 3085, "carmine" on Contreras 1523, "lilac" on Arnoldo 1693, "purple" on H. Pittier 7887, "violet-blue" on Dugand & Jaramillo 3324, "blue" on Breedlove 10615 & 12080, R. Irving 196, and Ton 1385, "lilac" on Contreras 3311 and Romero C. 9797, "pink" on F. A. Barkley 38Ch31, "purplish-pink" on Liogier 17637, "rose-violet" on López-Palacios 3095, "lilac to clear purple" on Ruiz-Teran & López-Palacios 6197, "pale-green" on Liogier 17505, and "lavender above, white below" on Crosby, Hespenheide, & Anderson 132.

This plant has been found growing in vacant lots, waste places, airfield clearings, and low forests, on bottomlands with large forest trees, along roadsides, on wooded slopes, and, according to Crosby and his associates, "very common in waste areas on back of river bed" [in Jamaica], from sealevel to 1950 m. altitude, flowering in February and from April to November, and fruiting in April and from July to November. Matsumura (1912) asserts that it is cultivated in Japan.

Irving remarks that he found it to be frequent "in dense stands of Melampodium americanum", Ton found it on slopes with Heliocarpus, Croton, and Erythrina along a small river and on grassy slopes with Quercus, and Liogier says that it is "common in open places along roadsides in coastal thickets on limestone". The vernacular name, "wild vervine" [sic] is recorded for it in Jamaica and the names "shon Lena" and "yerba distatia" in Curacao.

Rickett (1969) describes the plant as "erect or rather spreading, not usually more than 16 inches tall. The paired leaves have slender stalks up to an inch long and mostly elliptic, blunt, toothed blades up to 1 1/2 inches long. The spikes terminate the stems and branches which rise from the axils. They are 2—6 inches

long, quite narrow, and many-flowered. The small corolla is funnel-shaped, from rose to blue and purple, and less than 1/2 inch long." He avers that it blooms from March to November "in fields and waste land from western Texas to Arizona; also in Mexico, South and Central America, and the West Indies". Raeschel (1797) refers to it as a perennial. Macbride (1960) says that it "probably" extends into Peru from northern South America, but I have as yet seen no material of it from that country. He describes it as having the "calyx 5--9 (10) mm. long, the 2 cocci separating, about 7.5 mm. long, beak 1--1.5 (3) mm. long, dorsal surface often smooth, commissural often rough. Too many collections have been made of this weedy plant."

Gibson (1970) tells us that "Plants of this species usually wither when the rains end and are seldom seen during the dry months". Adams (1972) says "Rather local in the southern parishes [of Jamaica], a weed of open ground in thin pastures on limestone and dry alluvial gravel; 20--1000 feet; fl. and fr. June--Jan." and cites Adams 5511 & 5655, Harris 11792, and Powell 1020, giving its overall distribution as "S. United States, Mexico to northern S. Amer., Bahamas, Greater Antilles, Virgin Is., Antigua, Barbados."

López-Palacios (1973) illustrates very well the seed characteristics of the typical form of B. prismatica as compared with those of var. brevirostra Grenz. and var. longirostra Grenz. He cites Miller & Johnston 205 from Margarita Island and notes that B. prismatica and its var. longirostra "aparecen simultáneamente en varios estados [of Venezuela] y aún en el mismo lugar".

According to Savage (1945) the Linnean Herbarium in London contains one specimen of this plant:

"35 VERBENA

3 Verbena 4 prismatica [m. Sol.] Br.

[Sm:] Stachytarpheta prismatica Sm. in R. Cycl. n. 11"

Here, according to his explanation, "Verbena" is in Solander's handwriting, "prismatica" in Linnaeus's, the Stachytarpheta citation in Smith's, and "Br" stands for Patrick Browne, the collector of the specimen in Jamaica.

Alma Moldenke (1969) lists some references in mycological literature to fungi infesting Bouchea prismatica, notably Elsinoë boucheae Kevork., a spot anthracnose disease on the stems, leaf-blades, and petioles of this host. Hirata (1966) records Oidium verbenae on this host in Dominica and O. sp. in Venezuela.

The type of Rafinesque's Lomake brachiata was collected in Cuba, but Merrill (1949) is in error when he reduces it to synonymy under the genus Stachytarpheta Vahl.

A specimen of C. A. Ehrenberg 112, deposited in the herbarium of the Botanisches Museum in Berlin, was photographed there by Macbride as his type photograph number 17582, but is now destroyed.

It should be noted here that the Verbena curassavica scutellariae foliis, flore purpurascens accredited to William Sherard in

P. Hermann, Par. Bat. Prod. (1689) by Plukenet (1691) and Morison (1699) does not appear to occur in the New York Botanical Garden copy of that work. Sloane (1696) notes for his Verbena minima chamaedryos folio "Ad ripas fluvii Cobre dicti infra urbem St. Jago de las Vega repetitur". This locality is in Cuba, not Jamaica. Crantz (1766) cites "SLOAN. iam. 63. hist. l. p. 172. T. 107. F. 2" for this species and this citation is repeated by Schauer, but thus far I have been unable to locate or verify the existence of this illustration.

The Bouchea prismatica recorded by Gooding, Loveless, & Proctor (1965) from the Barbados Islands is most probably var. brevirostra Grenz. I have seen no material of typical B. prismatica from those islands, but have seen material of the variety from there. They cite Herb. Barb. Mus. 222 and Herb. Univ. W. Ind. 79.

Sloane (1755) calls this plant "The larger erect Vervine" [sic] and comments that "This plant has been commonly confounded with the following species [Stachytarpheta jamaicensis (L.) Vahl], from which it is easily distinguished by its growth and appearance; it is commonly divided into a great number of branches, and generally rises from one to two feet, or more, above the root." This statement is well illustrated by the fact that his Verbena folio subrotundo serrato flore caeruleo has often been placed in the synonymy of Stachytarpheta jamaicensis by various authors, including myself in my 1971 work!

Material of Bouchea prismatica has been misidentified and distributed in some herbaria as Priva lappulacea (L.) Pers., Stachytarpheta cayennensis (L. C. Rich.) Vahl, S. straminea Moldenke, and S. sp., as Bouchea prismatica var. longirostra Grenz., and as Pluchea sp.

On the other hand, the Barkley, Webster, & Rowell 7579 & 7642, Contreras 5669, Díaz Luna 256, H. E. Moore Jr. 1508, Pipes 58, Quintero 2637, Stewart & Johnston 2105, Stuessy 1006, Turner, Dodge, & Mason 2061, J. R. Walther 61, and Waterfall & Wallis 13883, all distributed as typical B. prismatica, are actually var. brevirostra Grenz., D. Powell 1020, E. Reed 587 & 588, and Yunker 17366 are var. longirostra Grenz., H. H. Rusby 915 is B. fluminensis (Vell.) Moldenke, Laughlin 2617 and Ventura A. 2646 are B. nelsonii Grenz., Hitchcock & Stanford 6905 is Ghinia curassavica (L.) Millsp., and Cuatrecasas & Castañeda 25472 is Stachytarpheta angustifolia f. elator (Schrad.) López-Palacios.

Additional & emended citations: MEXICO: Aguas Calientes: Rose & Hay 6220 (W--396033). Chiapas: Breedlove 10615 (W--2470262), 12080 (W--2470267); Laughlin 822 (Ac); Ton 1075 (W--2556595), 1385 (N, W--2557238). Federal District: W. Schumann 232 [1885] (W--1323023), 232 [1887] (W--1323022). Guanajuato: Knobloch 1078 (Mi). Hidalgo: Purpus 485 (Ca--138824, W--470290). Oaxaca: Rowell, Webster, & Barkley 174488 (Mi); H. H. Rusby 49 (W--574555).

Puebla: Rose & Hay 5949 (W-395740). Quintana R60: G. F. Gaumer 1935, in part (F-58733). Veracruz: R. Irving 196 (Au-246694). Yucatán: Arrington & al. s.n. [27.IX.1964] (Ip); Degener & Degener 26761 (N), 26762 (N, W); G. F. Gaumer 1139 (D-659191, E-954564, F-38519, V-10525, W-1265789), 1160 (F-38540), 24305 (F-552310); Lundell & Lundell 7876 (Du-362752, Ld, N, Se-165626); Steere 1071 (F-668593), 2127 (F-668596). State undetermined: C. A. Ehrenberg 112 [Macbride photos 17582] (F-663061, N-photo). GUATEMALA: El Petén: Aguilar Hidalgo 166 (E-1067875, F-713087); Contreras 1523 (Ld, Mi, S), 3311 (Ld, Ld, S); R. T. Ortiz 905 (N). HONDURAS: Copán: Barkley & Velez 40291 (Ld). CUBA: Las Villas: A. Gonzalez 447 (N). JAMAICA: Crosby, Hespeneheide, & Anderson 132 (Mi, N). HISPANIOLA: Dominican Republic: Abbott 958 (W-1078766); B. Augusto 1208 (N); Eggers 1878 (W-1323018); Faris 189 (W-1048464), 199 (W-1048474); Liogier 17505 (N), 17637 (N); Raunkiaer 1102 (W-1110127); Türkheim 2532 (E-118633, V-1132, W-656068). Haiti: Ekman H.7072 (W-1304615); Harshberger 51 (W-426764). PUERTO RICO: Britton & Britton 9499 (W-1409710); Britton & Wheeler 252 (W-847282); Goll 689 (W-409232); A. A. Heller 6109 (D-500590, E-118623, Ms-30912, W-426346); Sintenis 2117 (E-118626, V-70, W-403386); Underwood & Griggs 585 (W-405528). VIRGIN ISLANDS: St. Thomas: Eggers s.n. [Juli 1887] (W-1323202). LEEWARD ISLANDS: Antigua: Wulfschlägel 435 (V-88207). CURACAO: Rose & Rose 22012 (W-763424). NORTHERN SOUTH AMERICAN ISLANDS: Margarita: Gines 4031 (W-2174911); Miller & Johnston 205 (E-118625, W-534020). COLOMBIA: Antioquia: F. A. Barkley 38431 (Ft-3948); Daniel 2284 (Mi); F. W. Pennell 10825 (D-623263, W-1143079); Toro 324 (W-1342843). Atlántico: Allen 7 (E-1013896); Elias 1068 (F-680933). Bolívar: Dugand & Jaramillo 3324 (W-1852947), 3379 (W-1852979); Heriberto 81 (W-1036845); Romero-Castafeda 9797 (N), 9981 (Ac). Cauca: Holton 505 (D-610666); H. Pittier 833 (W-531024). Magdalena: Allen 517 (E-1014440). Valle del Cauca: Dryander 260 (W-1690541); Hutchison, Idrobo, & Wright 3085 (Ac, N). VENEZUELA: Aragua: H. Pittier 5830 (W-601540), 5832 (W-601542). Barinas: López-Palacios 3095 (Ld). Federal District: Eggers 13069 (W-1234544); E. Pittier 72 (W-1186939); H. Pittier 7887 (Mi), 9720 (W-1120755). Lará: Birkart 16621 (Ve). Mérida: López-Palacios 2564 (Ft); Ruiz-Teran & López-Palacios 6197 (N); Vareschi & Pannier 1546 (Ve-32344). Táchira: Steyermack & Velasco 100029 (Ld). Trujillo: E. Reed 1068 (W-1693919). State undetermined: Bolding s.n. [coast] (Ut-14394). CULTIVATED: Curacao: Arnoldo 1693 (W-2110533).

BOUCHEA PRISMATICA var. BREVIROSTRA Grenz.

Additional synonymy: Bouchea prismatica brevirostra Grenz. ex Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1807, in syn. 1970.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366]. 1932; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746. 1934; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 19 [thesis]. 1951; Howell & McClintock in Kearney & Peebles, Ariz. Fl., ed. 2, 730. 1960; Moldenke, Phytologia 7: 349. 1961; Langman, Select. Guide Lit. Flow. Pl. Mex. 335. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1256--1257. 1964; Gooding, Loveless, & Proctor, Fl. Barbados 355--356. 1965; Liogier, Rhodora 67: 350. 1965; Rzedowski & McVaugh, Contrib. Univ. Mich. Herb. 9: 107. 1966; Moldenke, Résumé Suppl. 15: 2. 1967; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 326. 1969; Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1807. 1970; Gibson, Fieldiana Bot. 24 (9): 179 & 180. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1336. 1970; Moldenke, Fifth Summ. 1: 31, 54, 62, 67, 78, 84, 106, 109, 112, 115, 122, & 400 (1971) and 2: 518, 571, 626, 628, 631, 665, 666, 736, 737, & 851. 1971; Moldenke, Phytologia 23: 414. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): [62] & 63, fig. 9--12. 1973; Moldenke, Phytologia 28: 434. 1974.

Illustrations: Grenz., Ann. Mo. Bot. Gard. 13: pl. 9, fig. 9--12, & pl. 12, fig. 30. 1926; Sanchez Sanchez, Fl. Val. Mex., ed. 1, fig. 261-B. 1969; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): [62], fig. 9--12. 1973.

Recent collectors have found this plant growing in fields, llanos, wet or wet open meadows, grassland, deserts, clearings, roadside marshes, dry open roadsides, in moist gravel, granitic soil on cliffs of sandstone and soft granite, in black volcanic soil among boulders, on hills, limestone hills with Prosopis and Acacia, and gently sloping pastured hills, in secondgrowth bordering airfields and in moist draws, among Quercus emoryi and in matorral of Prosopis, Celtis, and Karwinskia, in pestizal on hillsides and volcanic soil on mountainsides, in vacant lots and grassy valleys, in moist soil or fairly moist sandy-loam soil, in moist gravel and in black soil of basaltic outcrops, often in the open sun, on cropped hillsides, steep rocky volcanic outcrops, wet stony hillsides with Acacia, banks of irrigation ditches, shrubby or gentle igneous west slopes, shrub-covered flats and silty flats in deserts, among grasses, along roadsides, on hill-tops, in cropped grassland, and among shrubbery in sandy barrancas, at altitudes of 330--2490 m., flowering and fruiting from April to October.

Ugent and his associates have found this plant in weedy bean fields with Solanum cardiophyllum var. endoiodandrum and S. rostratum, on north-facing steep dry grazed slopes under Acacia and Opuntia with Castilleja and Solanum cardiophyllum, and at the

base of adobe walls and along roadsides under scattered acacias in a grazed field with Solanum pinnatisectum. Howell & McClintock refer to it as "frequent in rich shaded ground along streams", Stuessy calls it "common", while Iltis and his associates record it as "common in dense pure stands in wet open meadows". Díaz Luna encountered it "in potrero with isolated Pinus oocarpa and P. michoacana", while Rzedowski collected it on "ladera caliza con vegetación de matorral bajo de Karwinskia y Condalia" and "ladera de roxa cristalina con vegetación de matorral de Prosopis, Myrtillocactus, Agave, Opuntia y Eysenhardtia".

Contreras 8731 exhibits unusually large leaves, much like those normally seen in typical B. prismatica (L.) Kuntze.

Bouchea prismatica var. brevirostra is described by recent collectors as an erect herb, 50—60 cm. tall, although on the label of Waterfall 16384 it is stated that the plant may be "3--4 feet tall". It is said to be branched, often smaller in stature when growing among grasses. The corollas are described as having been "blue" on Breedlove 10615, 12080, & 14415, Stewart & Johnston 2105, and S. S. White 2605, "pale-blue" on Spivey 174, "purple-blue" on Feddema 1627, "purple" on Hinton 12998, Laughlin 1105, J. Rzedowski 286, 1348, & 16193, and Stuessy 1006, "lavender" on Harker & Mellowes 29 and Schery s.n., "pink" on Hinton 13036 & 13968 and Moore & Wood 4229, "pink-purple" on Contreras 5669, "rose" on J. Rzedowski 24644, "reddish" on H. E. Moore Jr. 1508, "carmine-lilac" on Contreras 8731, "purple to pink, white at base of lower lip" on McVaugh 16633, "lavender with whitish throat" on Feddema 1736, and "purple to lavender or pinkish, lower lip white at center" on McVaugh 16313.

McVaugh refers to this variety as "abundant" in Jalisco and "abundant especially in disturbed ground" in Aguas Calientes; Stewart & Johnston found it to be "frequent" in Chihuahua, and Feddema says that it is a "common weed" in Jalisco and Morelos, but "not abundant" in Nayarit. Iltis and his associates found it growing in "wet open meadows in openings high up near top of cerro" in Jalisco. The Moldenkes refer to it as "abundant on road shoulders and grazed areas" in Oaxaca. The vernacular name, "shep-uón", has been recorded for it.

Sanchez Sanchez (1969) describes the variety as "Planta herbácea, que mide 20—35 cm de altura, con el tallo tetra-angulado, pubescente, poco ramoso. Hojas ovales, crenado-dentadas, esparcidamente pilosas en ambas caras, que miden 4--8 cm de largo, por 3--5 de ancho. Racimos terminales, de 8 cm o algo más, con las flores pequeñas, cortamente pedunculadas, subsésiles, bracteadas, con las corolas violáceas.....Colectada los meses de julio y agosto. Desierto de Los Leones, Cañada de Contreras."

López-Palacios (1973) illustrates very well the differences in the seeds of this variety as compared to those of the typical form and of var. longirostra Grenz. He cites Miller & Johnston 205a from Margarita Island and notes that this variety often grows

together with the typical form in Mérida, Venezuela, and on Margarita Island.

The original description of Stachytarpheta laxiflora (regarded by me as a synonym of Bouchea prismatica var. brevirostra) is as follows: "(Tarphostachydes spicis elongatis). St caule fruticoso subtetragono tenuiter puberulo trichotomo, ramis dichotomis; foliis longiuscule petiolatis, basi parum attenuatis subrhomboidibus, a medio ad apicem argute serratis, utrinque vix puberulis; spicis e dichotomiis nascentibus longissimis laxifloris; calycis dentibus 4 setaceis bracteis oblongas aristatas fere duplo superantibus. Corolla coerulea, tubo e calyce parum exserto. In prov. Pamplona Novae Granadae, prope San Jose de Cuente, alt. 200 hexap. Linden No 1380."

The Bouchea prismatica recorded by Gooding, Loveless, & Proctor (1965) from the Barbados Islands is more probably var. brevirostra, since I have not as yet seen any of the typical form from those islands. They cite Herb. Barb. Mus. 222 and Herb. Univ. W. Ind. 79. The latter is probably the Barron s.n. [Bot. Stat. Herb. Barbados 79] which I have cited in a previous work as var. brevirostra.

Lomake brachiata Raf. is cited in the synonymy of this variety in Shreve & Wiggins (1964), but on what basis is not clear to me, since the type came from Cuba and this variety is not known from that island. Dr. Barkley's surname is misspelled "Berkley" on the label of Barkley, Rowell, & Paxson 737 at Austin.

Material of this variety has been misidentified and distributed in some herbaria under the names Bouchea prismatica (Jacq.) Kuntze, B. prismatica (L.) Kuntze, Phyla sp., Stachytarpheta sp., Valerianoides mutabilis (Jacq.) Kuntze, Verbena sp., and even Escholtzia glabra Benth.

Additional & emended citations: TEXAS: Val Verde Co.: C. Wright 1508 (W-43511). ARIZONA: Cochise Co.: Gooding 905 (Tu-98494), 235-60 (Tu-151336); Peebles, Harrison, & Kearney 3523 (W-1367918). Santa Cruz Co.: Harrison 8168 (W-1530787); J. Kaiser 459 (Gg-373579, Tu-106950). MEXICO: Aguas Calientes: Hartweg 178 (V-294441); R. McVaugh 16633 (Ip, Mi, N); J. Rzedowski 16193 (Ip, Mi). Chiapas: Breedlove 10615 (Ac, Ip), 12080 (Ld), 14415 (Ac, N, Ws); Laughlin 1105 (Ld). Chihuahua: LeSueur Mex. 91 (Ca-712706); Pringle 325 (Ms-30913, V-2513, W-57336), 994 (Ca-104994, E-118631); Shreve 9093 (Ca-731836); Stewart & Johnston 2105 (Au-300682, G); Stuessy 1006 (Au-257715, Bl-236060, Ws); Waterfall 12508 (St), 16113 (Ca); S. S. White 2325 (Mi), 2481 (Mi), 2605 (Mi). Colima: Edw. Palmer 104 (W-315457). Durango: Edw. Palmer 416 (Ca-138822, E-118622, W-304365); Shreve 9162 (Ca-731726). Federal District: Balls B. 5212 (Ca-684203); P. Bopp O. 215 (Ip); Bourgeau 545 (W-43505); G. L. Fisher 327 (E-914798, F-555003, W-1207412), 7480 (Tu-107885), s.n. [Tlalpam,

Aug. 3, 1924] (Ws); E. Lyonnet 317 (W—1034197); J. Rzedowski 236 (Ip), 1348 (Au—241396, Ip); Schmitz s.n. [Valle de Mejioco] (Bm). Guanajuato: Furness s.n. (F—467638); Spivey 174 (Ca—916735); Waterfall & Wallis 13883 (Au—183051, St), 13920 (St). Guerrero: R. Q. Abbott 309 (Ip); Moldenke & Moldenke 2319 (Id). Hidalgo: González Quintero 1071 (Ip), 2501 (Ip), 2637 (Ip, Mi, Tu—169596, Ws); H. E. Moore Jr. 1508 (Ba); Moore & Wood 4229 (Ba). Jalisco: F. A. Barkley 35520 (Ac, N); Barkley, Webster, & Rowell 7579 (Au—167059), 7642 (Au—167082); Díaz Luna 256 (Mi); Feddema 1736 (Mi); Harker & Mellowes 29 (Ip, Mi, Ws); Iltis, Koeppen & Iltis 823 (Ip, Mi, Ws); R. McVaugh 16313 (Mi, N); Edw. Palmer 261 (W—43502); Tuttle 333 (Tu—187728); Waterfall 15622 (St), 16384 (Ca); Weintraub & Roller 118 (Mi). México: Berlandier 838 (V—144780); Hinton 1152 (Id, Se—120051, Tu—112077); Paray 2413 (Ip); Parra A. 11 (Mi, N); Pefialosa 871 (Gg); J. Rzedowski 15845 (Ip). Michoacán: Arsène 2857 (E—845039—type, W—1003539—isotype), 3040 (E—845038, W—566648, W—1003540), 8489 (E—839731, W—1003462); Hinton 12998 (Id, Se—120047, Tu—112076), 13036 (Mi), 13968 (Id, Se—120069, Tu—112042); Schary s.n. [near Morelia, July 14, 1941] (Mi); Ugent & Flores C. 2071 (Ws); Ugent, Ugent, & Flores C. 1875 (Ws). Morelos: Feddema 1627 (Mi); Pipes 58 (Mi); J. R. Walther 61 (Mi). Nayarit: Feddema 595 (Ip, Mi); Waterfall 16341 (Ca). Oaxaca: Johnston & Davis s.n. [June 28, 1947] (Au—278271); Liebmann 11184 (W—1315034); Moldenke & Moldenke 2313 (Ac); Furpus 3405 (Ca—138823, E—118612, W—841138); Rowell, Webster, & Barkley 174488 (Au—170054); Seler & Seler 112 (W—1323017); Ugent, Ugent, & Flores C. 2625 (Ws). Querétaro: Arsène 9997 (E—844607, W—1003640); Barkley, Rowell, & Paxson 737 (Au—123232); Barkley, Webster, & Paxson 697 (Au—170146, Mi, Ws); Basile 98 (W—1268615); Rose, Painter, & Rose 9570 (W—453061); Waterfall 16533 (Ca). San Luis Potosí: Parry & Palmer 716 (E—118624, E—118632, W—57335); J. Rzedowski 3767 (Ip), 24644 (Ip). Sonora: Thurber 1094 (F—306233); Turner, Dodge, & Mason 2061 (Du—500479, Tu—142270); S. S. White 2634 (Mi), 3728 (Mi), 4055 (Mi, Tu—118661); Wiggins 7055 (Tu—98488). Tamaulipas: Stanford, Lauber, & Taylor 2302 (Se—147716). GUATEMALA: El Petén: Contreras 5669 (Au—254130, Id), 8731 (Id, Id). Huehuetenango: Seler & Seler 3072 (W—1205600). Santa Rosa: Heyde & Lux 2965 (W—43508, W—1323019). EL SALVADOR: Santa Ana: Calderón 2169 (W—1266534). San Vicente: P. C. Standley 21620 (W—1137386). WINDWARD ISLANDS: Barbados: Barron s.n. [Barbados Bot. Stat. Herb. 79] (W—845525). COLOMBIA: Nariffo: Lehmann B.T. 687 (W—794779). Norte de Santander: Linden 1380 (V—294467). VENEZUELA: Aragua: Burkart 16914 (Ve).

BOUCHEA PRISMATICA var. *LACINIATA* Grenz.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746. 1934; Moldenke, Phytologia 7: 349 (1961) and 9: 388 & 393. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 335. 1964; Moldenke, Fifth Summ. 1: 67 & 399 (1971) and 2: 678, 679, & 851. 1971.

Emended citations: MEXICO: Veracruz: Ervendberg 102 (E--925904 --photo of type).

BOUCHEA PRISMATICA var. *LONGIROSTRA* Grenz.

Additional synonymy: Veronica spicata jamaicana teucarii praten-sis folio dispermos Pluk. apud Moris., Pl. Hist. Univ. Oxon. 3: 419, in syn. 1699. Verbena dispermos americana lignescens veronicae foliis Moris., Pl. Hist. Univ. Oxon. 3: 419. 1699.

Additional bibliography: Pluk., Phytogr. 2: pl. 321, fig. 1. 1691; Moris., Pl. Hist. Univ. Oxon. 3: 419. 1699; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366]. 1932; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746. 1934; Moldenke, Phytologia 7: 349--350. 1961; Liogier, Rhodora 67: 349. 1965; Jiménez, Supl. Cat. Fl. Doming. 1: 210. 1966; Gibson, Fieldiana Bot. 24 (9): 179, 180, & 182. 1970; Moldenke, Fifth Summ. 1: 67, 81, 82, 93, 94, 100, 102, 104, 113, 115, & 122 (1971) and 2: 709 & 851. 1971; A. L. Moldenke, Phytologia 23: 318. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): [62] & 63, fig. 5--8. 1973; Moldenke, Phytologia 28: 436. 1974.

Illustrations: Pluk., Phytogr. 2: pl. 321, fig. 1. 1691; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 9 (13): [62], fig. 5--8. 1973.

Recent collectors describe this plant as an annual herb, 0.5--1 m. tall, with its leaves lighter green beneath. The corollas are described as having been "purple" on Mexia 107 and J. Rzedowski 18653, "pinkish-purple" on Holdridge 1042, "pink" on Hinton 12050, "rose-pink" on H. E. Moore 4928, "delicate pale-lavender" on D. Powell 1020, "mauve" on Alston 5438, and "lilac" on Romero-Castañeda 9797, while Ruiz-Teran & López-Palacios describe it as "flores de color lila a morado claro".

The plant has been found growing in dry soil, in poor dry soil on open hillsides, on dry hillsides with thin black soil over limestone outcrops, in deserts with water only in the rainy season, along roadsides and shaded roadsides, in tropical deciduous forests, and in tall stands with grass in sunny locations, at altitudes from sea-level to 4700 feet, flowering in March and from August to November, fruiting in March and from August to November. Miss Mexia describes the plant as "common" in Sinaloa. Rzedowski encountered it on "ladera basáltica con vegetación de bosque tropico deciduo".

Material of this variety has been misidentified and distributed in some herbaria under the names B. prismatica (L.) Kuntze, B. nelsonii Grenz., Stachytarpheta cayennensis (L. C. Rich.) Vahl, and S. jamaicensis L. On the other hand, the Dugand & Jaramillo

3324 & 3379, distributed as this variety, are actually typical B. prismatica (L.) Kuntze, while Tapia s.n. [25/IX/1965] is a mixture with B. nelsonii Grenz.

Additional & emended citations: ALABAMA: Mobile Co.: C. T. Mohr 794 (W--1323021), s.n. [Mobile, 1883] (W--771823). MEXICO: Guerrero: J. Rzedowski 18653 (Z). Hidalgo: H. E. Moore 4928 (Ba). Michoacán: Hinton 12050 (Ld, Mi, Se--120050). Oaxaca: Nelson 1599 (W--566032); Tapia s.n. [25/IX/1965] (Au--256588). Sinaloa: J. Gonzalez Ortega 6051 (D--615075, W--1209723); Mexia 107 (Ca--367354). Yucatán: Seler & Seler 3951 (F--144524, F--689831, W--1323025). BRITISH HONDURAS: Gentle s.n. [C. L. Lundell 4856] (F--683507). HONDURAS: Amapala: Horton & Morrison 8854 (Ca--643903). CUBA: Camaguey: Shafer 2861 (W--697308). Havana: Baker & Wilson 524 (W--845219); A. S. Hitchcock s.n. [Santiago de las Vegas] (F--229957). Las Villas: Combs 154 (E--118627, F--357965, W--1411616); A. Gonzales 447 (Mi, S); C. Wright 3660 (W--43515). Province undetermined: Sagra 818 (P). JAMAICA: R. C. Alexander s.n. [Kingston] (W--1048363); W. Harris 11792 (E--792611--type, W--790854--isotype); A. S. Hitchcock s.n. [Kingston streets] (E--118628, F--228168), s.n. [Port Royal] (E--118630); H. A. Lang 594 (D--554667); Maxon & Killip 314 (W--1046010); D. Powell 1020 (Mi); Yunker 17366 (Mi). HISPANIOLA: Dominican Republic: Valseur 217 (W--1414677). Haiti: Eyerdam 29 (W--1303137); Holdridge 1042 (Au--189215, Ca--913159, Mi); E. C. Leonard 2852 (W--1075098), 2981 (W--1075228), 4183 (W--1076607), 5219 (W--1077822), 9801 (W--1300846); Leonard & Leonard 12087 (W--1450937). PUERTO RICO: Britton, Cowell, & Brown 5378 (E--805365, W--791807). COLOMBIA: Atlántico: Elias 260 (W--1342546). Bolívar: Heriberto 208 (W--1036960); Killip & Smith 14035 (W--1350034); Romero-Castañeda 9797 (Ac); Schott 4 (F--41159). Cundinamarca: Arbeláez 2495 (W--1615650). VENEZUELA: Bolívar: Holt & Gehriger 174 (W--1471887). Federal District: Alston 5438 (N); H. Pittier 7887 (W--987984). Mérida: R. Reed 587 (W--1619027), 588 (Mi); Ruiz-Teran & López-Palacios 6177 (N).

BOUCHEA PSEUDOCASCANUM (Walp.) Grenz.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 327. 1893; A. W. Hill, Ind. Kew. Suppl. 8: 31. 1933; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 747. 1934; K. V. O. Dahlgren, Svensk Bot. Tidsk. 32: 231. 1938; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 327 (1946) and pr. 3, 1: 327. 1960; Moldenke, Phytologia 7: 350. 1961; Moldenke, Fifth Summ. 1: 147, 355, & 400 (1971) and 2: 627, 628, 631, & 851. 1971.

This species has been collected in anthesis and in fruit in January. Material has been misidentified and distributed in some herbaria under the name Stachytarpheta dichotoma Vahl.

Additional citations: BRAZIL: Guanabara: B. Lutz 523 (Ja, Ja--

23668); Mello Filho 1008 (Ja, Ja, Ja--52577); N. Santos 5819 (Ja, Ja); Segadas-Vianna 842 (Ja, Z). MOUNTED ILLUSTRATIONS: Schau. in Mart., Fl. Bras. 9: pl. 33. 1851 (N, Z).

BOUCHEA RUSEYI Moldenke

Additional bibliography: M. Kunz, Anatom. Untersuch. Verb. 40. 1911; A. W. Hill, Ind. Kew. Suppl. 9: 39. 1938; Metcalfe & Chalk, Anat. Dicot. 1031--1032. 1950; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448. 1952; Moldenke, Phytologia 4: 503--504. 1954; R. C. Foster, Contrib. Gray Herb. 184: 169. 1958; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448 (1966) and ed. 3, 448. 1971; Moldenke, Fifth Summ. 1: 181 & 400 (1971) and 2: 851. 1971.

Erdtman (1966) has examined the pollen of M. Bang 2226 from Bolivia and describes the grains as more or less of the same type as those of B. prismatica (L.) Kuntze, which see, but 129 μ x 87 μ in size.

Emended citations: BOLIVIA: El Beni: Buchtien 8183 (W--1543400). Province undetermined: M. Bang 2226 (E--7350--isotype, V--1273--isotype, W--350081--isotype, W--1323024--isotype).

BOUCHEA SPATHULATA Torr.

Emended synonymy: Bouchea spatulata Torr. ex A. Gray, Syn. Fl. N. Am., ed. 1, 2 (1): 335. 1878.

Additional bibliography: A. Gray, Syn. Fl. N. Am., ed. 1, 2 (1): 335. 1878; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 327. 1893; Steyererm. & Moore, Ann. Mo. Bot. Gard. 20: 801. 1933; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 327. 1946; Moldenke, Phytologia 4: 504 (1954) and 5: 6--7, fig. 12--16. 1954; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 327. 1960; Langman, Select. Guide Lit. Flow. Pl. Mex. 335. 1964; Rickett, Wild Fls. U. S. 3 (2): 366. 1969; Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1807 & 1871. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1336. 1970; Moldenke, Fifth Summ. 1: 54, 67, 401, & 402 (1971) and 2: 851. 1971; Anon., Biol. Abstr. 54 (4): B.A.S.I.C. S.33. 1972; Moldenke, Biol. Abstr. 54: 1725. 1972; Moldenke, Phytologia 23: 210 & 414. 1972; Hocking, Excerpt. Bot. A.23: 290. 1974.

Illustrations: Moldenke, Phytologia 5: 6--7, fig. 12--15. 1954.

Recent collectors describe this plant as a bush or shrub, 1--3 feet tall, erect, with large flowers, whose tube is to 3 cm. long & whose limb is 1.5 cm. wide when well pressed, and have found it flowering from July to September, fruiting in August and September, and growing at 3800 feet altitude. The corollas are described as having been "lavender" on C. H. Muller 3274, R. M. Stewart 1189, and B. H. Warnock 10749, "purplish" on I. M. Johnston 8367 and Johnston & Muller 381, "purple" on I. M. Johnston 9286 and R. M. Stewart 2938, "lavender-blue" on Johnston & Muller 640, and "lilac to bluish" on I. M. Johnston 8724.

The plant has been found growing on dry limestone slopes or rocky limestone slopes at canyon mouths and along arroyos. Warnock

reports that it is "frequent" or "infrequent" in limestone soil in Brewster County, Texas. In Coahuila it is described by Muller as "abundant in desert scrub on steep slopes", while Johnston reports it as "common on limestone ledges on north-facing mountain-sides" and "common on rocky flats and ridges". Stewart reports it as "common" on hillsides in Coahuila, while in the same Mexican state Johnston & Muller found it common below the oak and pine belt, in open valleys with scrub oaks and scattered pines, and on limestone ledges.

Steyermark & Moore (1933) comment that the species was "Collected previously in Texas by Hanson and Havard", while they found it on "Rock ridge above [Boquillas] canyon. The plants are suffruticose at the base, have thick coriaceous leaves, and bright purple corollas". Rickett (1969) describes it as "a densely branched shrub with leaves in pairs and threes, their blades rather thick, an inch long and widest at the end; no teeth, no stalks. It is a plant of western Texas and Mexico." The common name "spoon-leaf" is recorded for it.

The J. Baird s.n. [July 1936], distributed as B. spathulata, is actually Aloysia macrostachya (Torr.) Moldenke.

Additional & emended citations: TEXAS: Brewster Co.: H. C. Hanson 718 (W--983030); Moore & Steyermark 3446 (Ca--471421, D--695293, E--1008109); C. C. Parry s.n. [Great Cañon of the Rio Grande near Mt. Carmel] (W--49887--isotype); B. H. Warnock 10749 (Ld), 10766 (Ld). Oldham Co.: Havard 96 (F--252007, W--147554). MEXICO: Coahuila: I. M. Johnston 8357 (G), 9286 (G); Johnston & Muller 381 (Au--299381, G, Mi), 640 (Au--299693, G, Mi); C. H. Muller 3274 (Ca--725273, Ld, Mi); Purpus 4750 (Ca--148244); R. M. Stewart 1189 (Au--301996, G), 2938 (G).

BOUCHEA SPATHULATA var. LONGIFLORA Moldenke

Bibliography: Moldenke, *Phytologia* 23: 210 & 414. 1972; Anon., *Biol. Abstr.* 54 (4): B.A.S.I.C. S.22. 1972; Moldenke, *Biol. Abstr.* 54: 1725. 1972; Hocking, *Excerpt. Bot. A.* 23: 290. 1974.

This variety differs from the typical form of the species in having its corolla-tubes 3--4 cm. long.

Citations: MEXICO: Coahuila: I. M. Johnston 8724 (Au--299954--type, G--isotype).

BOOK REVIEWS

Alma L. Moldenke

"AMPHIBIANS AND REPTILES OF THE PACIFIC STATES" by Gayle Pickwell, xviii & 234 pp., illus., Facsimile Replication by Dover Publications, New York, N. Y. 10014. 1972. \$2.75 paperbound.

This new unabridged replication of the original 1947 work issued by the Stanford University Press is dedicated to the memory of the author by his son, George V. Pickwell. He has added a "Table of Changes in Nomenclature" augmenting the scientific value and convenience in usage. "My father's original intent was not just the presentation of a handbook for identification....but rather the presentation of the fascinating life stories of these animals, especially as he had himself observed them in the wild through long hours and days of field study. What he learned and wrote is still valid and useful in this context and I hope that a new generation of herpetologists [or even anyone with a temporary amateur or professional herpetological interest] will again find this to be so."

The many photographs have reproduced well. The descriptions of these classes generally, of the individuals and their habits and habitats, make valuable and very interesting reading.

"THE BOOK OF FLOWERS: Four Centuries of Flower Illustration" by Alice M. Coats, 208 pp., illus., McGraw-Hill Book Company, St. Louis & San Francisco & New York, N. Y. 10020. 1973. \$30.00 folio size.

This is an exquisitely beautiful, phyto-historically significant, botanically valuable and interesting labor of love. Flowers (s. l.) originally printed on paper or vellum for book illustrations from 1485 to 1850 comprise the 126 plates, most of which have not previously been reproduced. They are very well presented in either natural colors or black and white according to the original. Most come from rare, treasured books in the libraries of the Royal Horticultural Society, of Kew's Royal Botanic Gardens, and of Birmingham. Accompanying each plate are the English vernacular and the Latin scientific names, the source and its date, the artist with a comment on his training and work, and some of the uses and legends associated with the plant. Readers familiar with this author's "Flowers and Their Histories" and "The Plant Hunters" know that she has already carefully researched material from which to cull choice morsels of information.

The introduction is an excellent essay on botanical illustration, describing mainly the 16th century herbals, botanical books in embryo, the 17th century florilegiums, the 18th century botany

"beautifuls" reflecting Linnaeus' classification studies and colonial explorations with their concomitant botanical collecting, and the 19th century which was almost smothered with Redouté's gorgeous roses at the expense of other competent artists who lacked his charisma.

"Like a child between its parents, I walk holding by one hand to Agnes Arber's 'Herbals' (1938) and by the other to 'The Art of Botanical Illustration' by Wilfred Blunt and W. T. Stearn (1950); and only the fact that these two scholarly books are long out of print emboldens me to venture on the same subject." The "Book of Flowers" is a worthy credit to such great parentage.

"THE GENUS *LESQUERELLA* (CRUCIFERAE) IN NORTH AMERICA" by Reed C. Rollins & Elizabeth A. Shaw, xi & 288 pp., illus., Harvard University Press, Cambridge, Massachusetts 02138. 1973. \$18.00.

The last and also first comprehensive monographic treatment of this genus dates from over half a century ago by Edwin B. Payson in 1922. Since then many more collections have been added to herbaria. They have been studied along with all the types or type photographs. More field observations, chromosome numbers, electron microscope studies of pollen grains and trichomes, natural and induced interspecific hybridizations all provide a much broader background upon which to base this newer monograph. Professor Rollins' own first published studies on this genus date back to 1939: he still accepts basically the classical status of the genera *Alyssum* and *Vesicaria*, both of the Old World, and of *Physaria* and *Lesquerella*, both of the New World.

Lesquerella is treated here intentionally without any formal infrageneric alignments of 69 species, including 3 interspecific hybrids and 29 infraspecific taxa in North America. "Cross-pollination is the norm for the genus as a whole....In the field, insects, mostly bees and flies, were repeatedly observed visiting the flowers."

This splendid study is fully illustrated with excellent plant photographs and line drawings, geographic distribution maps, and fine electron microscope photographs of the above-mentioned pollen grains and trichomes.

"MOSESSES: UTAH AND THE WEST" by Seville Flowers & edited by Arthur Holmgren, xii & 567 pp., illus., Brigham Young University Press, Provo, Utah 84602. 1973. \$14.50.

In the Foreword Dr. William Steere quotes from a 1965 letter from Prof. Flowers "My 'Moss Flora of Utah' is nearly complete, except for a few tag ends". In 1929 a progenitor of this study appeared as "Mosses of Utah". Dr. Flowers died in 1968.

In the Preface Dr. Arthur Holmgren, who was required to re-

duce this lifetime study by one-third, managed to leave intact the important ecology notes "as it is here that the work of many years in the field shines through the text and illustrations". He justly appraised this work very highly as monumental on the "mosses of Utah and contiguous areas, providing keys, illustrations, descriptions and information on geographical distribution and habitats, and detailed observations by Seville Flowers. The flora will be useful to bryologists, range men, foresters, ecologists, and other botanists. This manual will serve as a guide to the moss flora of most of the intermountain region."

The book recognizes 256 species in 77 genera of 18 families, a surprisingly large number for this dry area, including both cosmopolitan species and endemics often first spotted by this author. Illustrating all these in excellently accurate and detailed drawings are 149 usually fullpage plates.

"SEASHORE LIFE OF PUGET SOUND, THE STRAIT OF GEORGIA, AND THE SAN JUAN ARCHIPELAGO" by Eugene N. Kozloff, x & 282 & xxviii plates, illus., University of Washington Press, London & Seattle, Washington 98105. 1973. \$15.00 clothbound, \$6.95 paperbound.

This is truly "a reasonably comprehensive, accurate, and well-illustrated guide to seashore life of Puget Sound and adjacent waters" responding to the growing interest in this marine environment on the part of amateurs, students and professional biologists who surely must be thankful that this helpful and compact source of information is now available.

The grossly visible animals and plants are described with some of their especially interesting life habits, pictured and grouped as they are found in the following habitats: floating docks and pilings, rocky shores, sandy beaches and quiet bays. There are 223 black/white photographs and line drawings and 68 lovely color photographs showing more animals than plants because the author is a highly skilled zoologist and marine ecologist long familiar with this area, rather than a botanist.

"WATER POLICIES FOR THE FUTURE: Final Report to the President and to the Congress of the United States by the National Water Commission" by Charles F. Luce et al., xxviii & 579 pp., illus., Water Information Center, Port Washington, New York 11050. 1973. \$17.50.

This is a photographic reproduction of the text of the paperback edition (\$9.30) issued by the United States Government Printing Office in the same year, planned for "enduring casebound format for general and reference use" which it certainly deserves. Our country needs it. Most of the included information is even applicable to other parts of the world.

At the end of each of the 17 chapters there are what seem to be

logical and necessary recommendations. The chapters deal with such topics as forecasting future demands, pollution control, increasing supply, etc., in forthright, non-verbose style. The illustrations consist of a few important and intelligible diagrams and several fine black/white photographs that are pertinent to the text. All is well indexed. There are no hare-brained schemes suggested.

This printing, in addition to the U. S. Government one -- if the books are actually opened and read -- will keep these ideas circulating for consideration rather than possibly being obliviously buried, as so many committee reports are!

"MYCOLOGY GUIDEBOOK" edited by Russell B. Stevens for the Mycological Society of America, xxiv & 703 pp., University of Washington Press, Seattle, Washington 98105. 1974. \$15.00.

With the blessings of the National Science Foundation (in monetary form) bestowed upon the Mycological Society of America a dedicated committee of its leaders interested in improving undergraduate and graduate instruction in "their" subject have produced by offset printing this excellent compendium of enrichment ideas, procedures, sources, organism index, and bibliography.

In the first paragraph of the preface are two important suggestions that are valid for almost all biology survey courses of groups in this country or in any other: "(1) Introduction of considerably more living material and (2) supplementation of the orthodox morphological view with information from genetics, physiology, industrial mycology, fungus ecology and medical mycology". No matter how inexperienced or experienced in teaching nor how limited by or thoroughly trained in mycological studies, every teacher in this field from now on would be foolish not to consult this unique and valuable guide.

A few misspellings slipped through, as, for instance, release on p. xx, compatibility on p. 273, and symbiont on p. 313.

"WASHINGTON STATE: National Parks, Historic Sites, Recreation Areas and Natural Landmarks" by Ruth Kirk, 64 pp., illus., University of Washington Press, London & Seattle, Washington 98105. 1974. \$1.95 paper-back in large magazine format.

The 78 well chosen and nicely printed color photographs taken by the naturalist-author and her husband, a former park naturalist, show an appreciative understanding of the plant and animal life, the geological/geographical formations, and the living of the early natives and settlers in these special sites. The descriptive text is invitingly written and carries much of ecological import. It is a fine guide book for these places, but it is also really more -- a lovely souvenir of trips taken, planned or just dreamed about.

"QUATERNARY PLANT ECOLOGY: The 14th Symposium of the British Ecological Society, University of Cambridge, 28-30 March 1972" edited by H. J. B. Birk & R. G. West, ix & 326 pp., illus., Blackwell Scientific Publications, London, & Halsted Press of John Wiley & Sons, Toronto & New York, N. Y. 10016. 1973 [1974]. \$44.50 oversize.

Well over a hundred scientists, mainly from the British Commonwealth and Scandinavia, attended this symposium. Carefully prepared papers and their limited discussions are herewith available to many more scientists and students. The book can exist because of anemophily and good human minds, it seems.

Using "the present to model the past", pollen analysts are "increasingly investigating the present-day geographical variation in pollen sedimentation in a variety of depositional environments in an attempt to find suitable quantitative models for interpreting fossil pollen assemblages in terms of past vegetation and environment." The presentations are grouped as follows: (1) methodological problems in palynology by four Americans, (2) pollen dispersal and sedimentation through air and water, (3) pollen representation in various climate zones, (4) plant macrofossils in lakes, (5) vegetational history and community development including the juxtaposition of species for which there are no modern analogs (wherein palaeoecology may best contribute to modern ecological theories and concepts), (6) palaeo-limnological documenting quantitatively the changes in populations of lake biota over the last few centuries, and (7) a thoughtful summation by a present-day ecologist who mentions that "palaeoecological evidence is giving us increasing insight into the influence of human activity, at scales ranging from the very local effects.... to the broad regional changes".

"A GUIDE TO NATURAL COSMETICS" by Connie Krochmal, 227 pp., illus., Quadrangle/The New York Times Book Company, New York, N. Y. 10022. 1973. \$8.95.

This popularly oriented book discusses, after an interesting historical survey, those natural products for and methods of "enhancing attractiveness and appearance that are within the realm of practicability in the ordinary American [or typical western-cultured] home." Most of the materials for lotions, creams, oils, baths, nails, shaving, sachets, soaps, tooth and mouth cleansers, and perfumes are of plant origin, while a few such as musk, lanolin, beeswax and cochineal dyes are of animal origin.

Easy to follow recipes are given for all of these by the author who is really expert in this field. Biologically there are a few slips, such as "insect and animal materials". The essential oil of verbena esteemed in Egypt and Greece [inferring Ancient] would have to have been from the leaves of "Lippia citriodora and others" — but Lippia citriodora, now known more correctly as

Aloysia triphylla, is a native of Argentina and has only recently been introduced farther afield. The verbena of the Mediterranean and Fertile Crescent part of the world was and is Verbena officinalis.

Many folks will enjoy using this book.

"STURTEVANT'S EDIBLE PLANTS OF THE WORLD" edited by U. P. Hedrick, vii & 686 pp., Facsimile Replication by Dover Publications, New York, N. Y. 10014. 1972. \$5.00 paperbound.

"This unabridged republication originally appeared as Volume 2, Part II, of the "Report of the New York Agricultural Experiment Station [at Geneva, N. Y.] for the Year 1919" under the more abbreviated title "Sturtevant's Notes on Edible Plants". These notes, in much more voluminous form, were left by Dr. E. Lewis Sturtevant when he retired as director of this station in 1887. Dr. U. P. Hedrick, its horticulturist, prepared this text in truly usable form. Entries are arranged alphabetically, as

"Psophocarpus tetragonolobus DC. Leguminosae. Goa Bean.

This plant is grown in India for the sake of its edible seeds and also for use as a string bean. The pod is six to eight inches long, half an inch wide, with a leafy kind of fringe running along the length of its four corners.....Wight calls it a passable vegetable [confirmed by myself after eating it in Sri Lanka this year]Pickering says it is a native of equatorial Africa....observed by Cada Mosto in Senegal in 1455".

Abbreviated footnotes appear directly on each page and the detailed bibliography appears at the end of the book, followed by an index to common names.

There is a wealth of valuable material well organized here, and therefore especially welcomed in this inexpensive reprinting.

"TEXTBOOK OF THEORETICAL BOTANY" by R. C. McLean & W. R. Ivimey-Cook (deceased), vii & 595 pp. from 3317 to 3912, illus., Halsted Press of John Wiley & Sons, New York, N. Y. 10016. 1973. \$28.50.

This volume is devoted very effectively to ecology and geography. For the former are developed ecological scope and concepts, an analysis of the plant community, and the nature of environment with subdivisions such as sub-aerial, biotic, edaphic, freshwater, marine including productivity of the sea and its beaches. For the latter are developed the basic phytogeographical principles and methods, geological background, climate, distributional areas, migration, dispersal and concomitant discontinuities, floristic components and provinces, and the influences of man.

"An ecosystem is a natural 'whole', an organic entity which is more than the sum of its parts considered separately. The holis-

tic concept of Smuts should be part of all biological thinking."

This text in its full five volume form should be valuable to any botany student beyond the beginning level, any botany teacher and any professional botanist, but it would be so much more useful to many different students and scientists if the indexes in this and the other volumes listed all, rather than just some, of the organisms mentioned even if only to genus.

"TRANSPORT OF NUTRIENTS IN PLANTS" by A. J. Peel, iv & 258 pp., illus., Butterworth & Co., Publishers, London WC2B 6AB & Wiley & Sons, Inc., New York, N. Y. 10016. 1974. \$15.00.

It is impossible to read this study without picking up the author's enthusiasm for his work, his encouragement to others to join in, his own careful studies, his intelligent evaluations of all experimental work on the movement of nutrient solutes into, through and out of phloem for distances of just microns up to many meters as in tall trees. Special attention is given to solute loading control, velocity control, passive and active sieve tube transport, movements and effects, of growth regulator hormones. This is mostly a carefully prepared interim report.

References, glossary, abbreviations, author and subject indexes are given. Plant names are often given only to genus or only as synonyms (as, for instance, Lens culinaris for Lens esculenta).

"Transport of nutrients is such an essential aspect of the growth of plants that knowledge of the patterns of movement must play an ever-increasing role in the manipulation of economically important species so that these are able to provide the maximum yield."

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NEW COMBINATIONS RELEVANT TO THE CYPERACEAE TRIBE CYPEREAE
OF TROPICAL AMERICA

Tetsuo KOYAMA

The New York Botanical Garden

While preparing the taxonomic treatment for the Cyperaceae volume of the Flora Neotropica, a number of new combinations of names have been proposed for the species of the Cyperaceae tribe Cyperae. Since it will be at least two years before the whole manuscript goes to press, it is attempted here to validate these manuscript names for immediate use.

Genus MARISCUS Gaertner
(nom. conserv.)

- MARISCUS APICULATUS (Liebmann), n. comb. Cyperus apiculatus Liebmann in Vidensk. Selsk. Skr. V, 2: 220. 1851.
- MARISCUS BLODGETTII (Britton), n. comb. Cyperus blodgettii Britton in Bull. Torrey Club 17: 316. 1890.
- MARISCUS CAMPHORATUS (Liebmann), n. comb. Cyperus camphoratus Liebmann in Vidensk. Selsk. Skr. V, 2: 216. 1851.
- MARISCUS CEARAENSIS (R. Gross ex Kükenthal), n. comb. Cyperus cearaensis R. Gross ex Kükenthal in Pflanzenr. 4(20), 101 Heft: 466. 1936.
- MARISCUS CILIATUS (Junghuhn), n. comb. Cyperus ciliatus Junghuhn in Linnaea 6: 25. 1831.
- MARISCUS CORNELLII-OSTENII (Kükenthal), n. comb. Cyperus cornellii-ostenii Kükenthal in Feddes Repert. Sp. Nov. 29: 198. 1931.
- MARISCUS DISCIGERUS (Liebmann), n. comb. Cyperus discigerus Liebmann in Vidensk. Selsk. Skr. V, 2: 212. 1851.
- MARISCUS DISSOLUTUS (H. B. K.), n. comb. Cyperus dissolutus Humboldt, Bonpland, & Kunth in Link, Jahrb. Gewächsk. 1, Heft 3: 87. 1820.
- MARISCUS EKMANII (Kükenthal), n. comb. Cyperus ekmanii Kükenthal in Feddes Repert. Sp. Nov. 23: 186. 1926.
- MARISCUS FAMILIARIS (Steudel), n. comb. Cyperus familiaris Steudel, Synops. Pl. Glumac. 2: 46. 1855.
- MARISCUS FENDLERIANUS (Böckeler), n. comb. Cyperus fendlerianus Böckeler in Linnaea 35: 520. 1868.
- MARISCUS FILICULMIS (Vahl), n. comb. Cyperus filiculmis Vahl, Enum. Pl. 2: 328. 1806.
- MARISCUS FULIGINEUS (Chapman), n. comb. Cyperus fuliginus Chapman, Fl. Southeast. U. S. 511. 1872.
- MARISCUS GRAYI (Torrey), n. comb. Cyperus grayi Torrey in Ann. Lyc. New York 3: 268. 1836.
- MARISCUS HOUGHTONII (Torrey), n. comb. Cyperus houghtonii Torrey in Ann. Lyc. New York 3: 277. 1836.
- MARISCUS INFUSCATUS (Kunth), n. comb. Cyperus infuscatus Kunth, Enum. Pl. 2: 86. 1837.

- MARISCUS MOHRRII (Britton), n. comb. Cyperus mohrii Britton ex C. B. Clarke in Kew Bull. Add. Ser. 8: 10. 1908.
- MARISCUS MULTIFOLIUS (Kunth), n. comb. Cyperus multifolius Kunth, Enum. Pl. 2: 91. 1837.
- MARISCUS NANUS (Willdenow), n. comb. Cyperus nanus Willdenow, Sp. Pl. 1: 272. 1798.
- MARISCUS PICARDAE (Böckeler), n. comb. Cyperus picardae Böckeler in Allg. Bot. Zeitschr. 2: 18. 1896.
- MARISCUS RIGENS (Presl), n. comb. Cyperus rigens Presl, Reliq. Haenk. 1: 170. 1828.
- MARISCUS SCHWEINITZII (Torrey), n. comb. Cyperus schweinitzii Torrey in Ann. Lyc. New York 3: 276. 1836.
- MARISCUS SERTULARINUS (Liebmann), n. comb. Cyperus sertularinus Liebmann in Vidensk. Selsk. Skr. Kjøbenhavn V, 2: 213. 1851.
- MARISCUS SPECTABILIS (Link), n. comb. Cyperus spectabilis Link, Hort. Berol. Descr. 1: 318. 1827.
- MARISCUS SUBCARACASANUS (Kükenthal), n. comb. Cyperus subcaracasanus Kükenthal in Arkiv för Bot. 22 (A. Nr. 17): 5. 1929.
- MARISCUS SUBUNIFLORUS (Britton), n. comb. Cyperus subuniflorus Britton in Small, Fl. Southeast. U. S. ed. 2, 173. 1903.
- MARISCUS TENUIS (Swartz), n. comb. Cyperus tenuis Swartz, Progr. Veg. Ind. Occid. 20. 1788.
- MARISCUS THYRSIFLORUS (Schlechtendal), n. comb. Cyperus thyrsoflorus Schlechtendal & Chamisso in Linnaea 6: 24. 1831.
- MARISCUS UNIFOLIUS (Böckeler), n. comb. Cyperus unifolius Böckeler in Linnaea 36: 374. 1870.
- MARISCUS WACKETTII (Kükenthal), n. comb. Cyperus wackettii Kükenthal in Pflanzenr. 4(20), 101 Heft: 443. 1936.
- MARISCUS WRIGHTII (Britton), n. comb. Cyperus wrightii Britton in Bull. Torrey Club 13: 215. 1886.

Genus PYCREUS P. Beauv.

- PYCREUS CAMAGUEYENSIS (Britton), n. comb. Cyperus camagueyensis Britton in Mem. Torrey Bot. Club. 16: 59. 1920.
- PYCREUS FILICINUS (Vahl), n. comb. Cyperus filicinus Vahl, Enum. Pl. 2: 332. 1806.
- PYCREUS LANCEOLATUS (Poirot), n. comb. Cyperus lanceolatus Poirot, Encycl. Meth. Bot. 7: 245. 1806.
- PYCREUS NIGER (Ruiz & Pavon), n. comb. Cyperus niger Ruiz & Pavon, Fl. Peruv. 1: 47. 1798.

Genus TORULINIUM Desvaux

- TORULINIUM HARRISII (Kükenthal), n. comb. Cyperus harrisii Kükenthal in Feddes Repert. Sp. Nov. 23: 191. 1926.
- TORULINIUM FLEXUOSUM (Vahl), n. comb. Cyperus flexuosus Vahl, Enum. Pl. 2: 359. 1806.
- TORULINIUM MACROCEPHALUM (Liebmann), n. comb. Cyperus macrocephalus Liebmann in Vidensk. Selsk. Skr. Kjøbenhavn V, 2: 221. 1851.

NOTES ON NEW AND NOTEWORTHY PLANTS. LXXI

Harold N. Moldenke

ALOYSIA GRATISSIMA f. *MACROPHYLLA* Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum ellipticis vel ovato-ellipticis usque ad 3 cm. longis 1.5 cm. latis margine grosseserrato-dentatis subtus densiuscule piloso-pubescentibus recedit.

This form differs from the typical form of the species in having its leaf-blades much larger both on sterile and on floriferous shoots, to 3 cm. long and 1.5 cm. wide, the margins conspicuously and rather irregularly coarsely serrate-dentate with more or less divergent acute teeth, and rather densely pilose-pubescent beneath, more conspicuously so on the vein and veinlet reticulation.

The type of this form was collected by Charles Christopher Parry, John Milton Bigelow, Charles Wright, and Arthur Carl Victor Schott in "mountain tracks", Presidio del Norte, Presidio County, Texas, on August 4, 1852, and is deposited in the Columbia University herbarium now preserved at the New York Botanical Garden.

AVICENNIA GERMINANS var. *GUAYAQUILENSIS* (H.B.K.) Moldenke, comb. nov.

Avicennia tomentosa var. *guayaquilensis* H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 230—231. 1817.

LATHYRUS LATIFOLIUS f. *RUBICUNDUS* Moldenke, f. nov.

Haec forma a forma typica speciei corollis rubicundis recedit.

This form differs from the typical form of the species in having light-pink corollas.

The type of the form was collected by Alma Lance Moldenke and Harold Norman Moldenke (no. 28613) along fencerows at Tabernacle, Burlington County, New Jersey, on June 28, 1974, and is deposited in the herbarium of Cairo University at Giza, Egypt.

LIPPIA LINDMANII f. *OPPOSITIFOLIA* Moldenke, f. nov.

Haec forma a forma typica speciei foliis decussato-oppositis recedit.

This form differs from the typical form of the species in having its leaves arranged in decussate-opposite fashion on the stems.

The type of the form was collected by Howard Samuel Irwin and Thomas R. Soderstrom (no. 6616) in cerrado about 10 km. south of Garapú, at an elevation of 300 to 400 meters, Mato Grosso, Brazil, 13°12' S., 52°34' W., on October 3, 1964, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collectors note that the plant is a few-branched erect shrub, the bracts pink, and the corollas pink with a yellow throat.

PAEPALANTHUS BIFIDUS f. *BREVIPIES* Moldenke, f. nov.

Haec forma a forma typica speciei pedunculis floriferis fructiferisque plerumque 1--3 cm. longis recedit.

This form differs from the typical form of the species in having its peduncles during full anthesis and/or fruit mostly only 1--3 cm. in length.

The type of the form was collected by Ynes Henriquetta Julietta Reygadas [née Mexia] (no. 5816) in sandy soil among rocks, at 1250 meters altitude, on the slope of the Serra do Rio Grande, Diamantina, Minas Gerais, Brazil, on May 12, 1931, and is deposited in the Britton Herbarium at the New York Botanical Garden. The distinguished collector describes the plant as an herb with brownish-white flowers, and says that it was common locally.

PAEPALANTHUS BIFIDUS f. *FRUSTUS* Moldenke, nom. & stat. nov.

Eriocaulon pygmaeum Mart., Flora 24, Beibl. 2: 60. 1841 [not *E. pygmaeum* Soland., 1809].

PETREA KOHAUTIANA var. *PILOSULA* Moldenke, var. nov.

Haec varietas a forma typica speciei recedit foliis ad apicem plerumque distincte emarginatis aristisque et calycibus receptaculisque ubique dense vel parce albido-pilosulis.

This variety differs from the typical form of the species in having its leaf-blades normally very distinctly rounded-emarginate at the apex, sometimes with the two lobe-like portions of the blade cordately overlapping, and with a sharp and firm projecting erect or divergent arista about 3 mm. long arising from the termination of the midrib.

The type of this distinct variety was collected by Luis Ruiz-Teran and Santiago López-Palacios (no. 7641) in cultivation as an ornamental at La Cejita, district Valera, Trujillo, Venezuela, on September 22, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as an erect shrub, 2 m. tall, with purple "flowers".

STACHYTARPHETA SPATHULATA Moldenke, sp. nov.

Frutex 1 m. altus ramosissimus; ramis ramulisque densissime pubescentibus, pilis divergentibus canescentibus; internodiis perbrevis; foliis numerosis simillimis spathulatis; petiolis 5--7 mm. longis densissime canescenti-pubescentibus; laminis suborbicularibus 8--12 mm. longis latisque subra viridibus subtus albo-canescens ad apicem rotundatis ad basin in petiolum abrupte attenuatis marginibus serratis supra dense breviterque pubescentibus, subtus perdensissime albido-pubescentibus subtomentosis, reticulo venularum supra indistincta subtus saepe distincta; inflorescentiis terminalibus spicatis sessilibus vel subsessilibus 6--10 cm. longis gracilibus densifloris ubique dense pubescentibus; corollis atrocaeruleis.

Shrub, about 1 m. tall, much branched; branches and branchlets slender, short, numerous, very densely pubescent throughout with divergent canescent hairs; internodes much abbreviated,

mostly 1--2 cm. long or less; leaves numerous on branches and branchlets, decussate-opposite or ternate, distinctly spatulate, remarkably uniform in size and shape; petioles 5--7 mm. long, margined, very densely canescent-pubescent with divergent hairs; leaf-blades mostly suborbicular, 8--12 mm. long and wide, dark-green above, white-canescant beneath, rounded at the apex, very abruptly attenuate at base into the petiole, serrate along the margins from the widest part to the apex with rather regular and very distinct teeth, densely short-pubescent above, very densely white-pubescent or submentose beneath, the veinlet reticulation mostly indistinct above but often distinct through the pubescence beneath; inflorescence terminal, spicate, sessile or subsessile, 6--10 cm. long, slender, the rachis and appressed calyxes and bracts about 3 mm. wide, densely pubescent throughout like the branchlets; bractlets lanceolate, about 3 mm. long, mostly appressed to the calyx; calyx 6 mm. long, densely canescent-puberulent; corolla infundibular, dark-blue, the tube about 10 mm. long, glabrous on the outside.

The type of this species was collected by William Russell Anderson (no. 8515) on a rocky hillside in an area of steep rocky (quartzite) hillside sloping down to gallery forest, with seeps and sedge meadows (brejo) just above the forest, at an elevation of 1400 meters, about 18 km. by road southwest of Diamantina on the road to Curvelo, in the Serra do Espinhaço, Minas Gerais, Brazil, on April 10, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey.

SYNGONANTHUS BISUMBELLATUS var. *FROESII* (Moldenke) Moldenke, stat. nov.

Syngonanthus froesii Moldenke, *Phytologia* 14: 399--400. 1967.

SYNGONANTHUS UMBELLATUS f. *MINOR* (Miq.) Moldenke, comb. nov.

Paepalanthus umbellatus f. *minor* Miq. in sched. impr. mult. ed. Hohenacker Pl. Hostm. & Kappl. 592b.

Haec forma a forma typica speciei statura multo minore differt. Holotyp. in herb. monac.

SYNGONANTHUS XERANTHEMOIDES var. *CONFUSUS* (Körn.) Moldenke, stat. nov.

Paepalanthus confusus Körn. in Mart., *Fl. Bras.* 3 (1): 433. 1863.

SYNGONANTHUS XERANTHEMOIDES var. *HIRSUTUS* Moldenke, var. nov.

Haec varietas a forma typica speciei vaginis densissime hirsutis pilis patentissimis et foliis brevioribus 8--13 cm. longis versus basin plusminusve patento-hirsutulis recedit.

This variety differs from the typical form of the species in having its leaf-sheaths very densely hirsute (with the hairs standing at right angles to the sheath) and the leaves shorter, only 8--13 cm. long, 3--5 mm. wide, rather obtuse at the apex, and more or less hirsutulous toward the base.

The type of the variety was collected by Carl Friedrich Philipp von Martius (no. 561) on the campos at Boa Perna, Minas Gerais, Brazil, probably in 1818, and is deposited in the herbarium of the Botanical Museum at Munich.

SYNGONANTHUS XERANTHEMOIDES var. *MELANOLEPIS* (Alv. Silv.) Moldenke, comb. nov.

Syngonanthus vernonioides var. *melanolepis* Alv. Silv., Fl. Mont. 1: 396. 1928.

SYNGONANTHUS XERANTHEMOIDES var. *MINOR* (Kunth) Moldenke, comb. nov.

Paepalanthus vernonioides ♂ *minor* Kunth, Enum. Pl. 3: 529. 1841.

SYNGONANTHUS XERANTHEMOIDES var. *VERNONIOIDES* (Kunth) Moldenke, stat. & comb. nov.

Paepalanthus vernonioides Kunth, Enum. Pl. 3: 528. 1841.

VERBENA PLATENSIS f. *IVERIANA* (Bosse) Moldenke, comb. nov.

Verbena teucriodes f. *iveriana* Bosse ex Voss in Vilm., Blumen-gärt. 1: 827. 1895.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XLVIII

Harold N. Moldenke

ERIOCAULACEAE Lindl.

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48 (1): 244. 1926; O. C. Schmidt in Just, Bot. Jahresber. 52 (1): 156 [138]. 1927; Wangerin in Just, Bot. Jahresber. 49 (1): 160. 1927; Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: 176—178 & 844, pl. 186—188. 1928; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60—61 [42—43]. 1928; M. A. Johnstone, Pl. Ecology 65—66 & 159. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 89 & 168—171 (1929), 50 (1): 231—232 & 317 (1930), and 53 (2): 261. 1930; Alston in Trimen, Handb. Fl. Ceylon 6: 303—306. 1931; Fedde in Just, Bot. Jahresber. 49 (2): 522—423 (1932) and 50 (1): 684. 1932; Rydb., Fl. Prairies & Plains, pr. 1, 198, 940, & 956, fig. 107. 1932; Fedde in Just, Bot. Jahresber. 51 (2): 295—296 (1933) and 52 (1): 786. 1934; Perrier de la Bâthie, Cat. Pl. Madagascar. 21—22. 1934; Dole, Fl. Vt., ed. 3, 78. 1937; Alston, Kandy Fl. xvi & 76. 1938; Pellegr., Mém. Soc. Linn. Normand. 26 [ser. 2, 1 (4)]: 58. 1938; Pellegr., Fl. Mayomb. 3: 58. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 29. 1940; Vester, Bot. Arch. 41: 346, fig. 126. 1940; Erdtman, Introd. Pollen Analys. 56, [57], & 236, pl. 1, fig. 10 & 11. 1943; León, Fl. Cuba 1: 278—284 & 426, fig. 112 & 113. 1946; P. R. Mill., Ind. Pl. Diseases U. S. 2: 327. 1950; Scoggan, Natl. Mus. Canada Bull. 115: 146. 1950; Anon., Taxon 1: 29. 1951; Metcalfe, Taxon 1: 130. 1951; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 163, 523, & 537, fig. 94A. 1952; Bond, Wild Fls. Ceylon Hills xiii & 232—233. 1953; Anon., Taxon 4: 68. 1955; Kramer, Taxon 4: 238. 1955; Moldenke in R. E. Schult., Bot. Mus. Leaflet. Harvard Univ. 17: 66. 1955; Ikuse, Pollen Grains Jap. 46. 1956; M. T. Davis, Taxon 6: [170], 179, & 181. 1957; Kramer, Taxon 6: 242. 1957; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; R. McVaugh, N. Y. State Mus. Bull. 360A: 93. 1958; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140—141. 1959; Hangulee, Das, & Datta, College Bot. 1: 841. 1959; Kramer, Taxon 8: 77. 1959; Rickett & Stafleu, Taxon 8: 232. 1959; Braga, Pl. Nordest., ed. 2, 20. 1960; K. Jones, Taxon 9: 183 & 187. 1960; Kramer, Taxon 9: 59. 1960; Beug, Leitfaden Pollenbest. 1: vi, 59, & 60, pl. 8, fig. 7—9 & text fig. 17 a & b. 1961; Van Steenis, Pacif. Pl. Areas 1: 103. 1963; Faegri & Iversen, Textb. Pollen Analys., ed. 2, pr. 1, 193 & 221. 1964; Takhtajan, Taxon 13: 163 & 164. 1964; Nair, Pollen Grains West. Himal. Pl. [Asia Monogr. 5:] viii, 35, 42, & 92, pl. 15, fig. 194. 1965; E. G. Voss, Mich. Bot. 4: 17, 22, & 23. 1965; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, pr. 1, 163, 523, & 537, fig. 94A. 1966; Faegri & Iversen, Textb. Pollen Analys., ed. 2, pr. 2, 193 & 221. 1966; Nair, Essent. Palynol. 21, [23], [34], & 94, fig. 43. 1966; Stuckey, Mich. Bot. 5: 105. 1966; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, vii & lii. 1967; Friedrich-Holzhammer & Roessler in Merxmüller, Prodr. Fl. Südw. Afr. 15, 159: [1]—2. 1967; Kramer, Taxon 16: 58 & 211. 1967; C. E. Wood, Taxon 16: 27—28. 1967; Deb, Sengupta, & Malick, Bull. Bot. Soc. Bengal 22: 210. 1968; Gunawardena, Gen. & Sp. Pl. Zeyl. 206—207. 1968; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: 11, 16, & 20. 1969; Cronq., Taxon 18: 193. 1969; B. Hansen, Dansk Bot. Ark. 27: 29—33. 1969; Keng, Ord. & Fam. Malay. Seed Pl. 313—314, fig. 183. 1969; Kirpicznikov, Tax-

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The Kürnicke (1856) reference which occurs so often in the bibliography of this family is often cited as "1854", the title-page date, but pages 129--799 were actually not published until April of 1856. The Durand & Schinz (1894) item is often cited as "1895", the title-page date, but pages 465 to the end were actually published in 1894.

Angely (1969) accepts as valid a "Sub-series Eriocaulinales". Harborne (1973) reports for the Eriocaulaceae, as a family, the "general overall flavonoid pattern based on frequency of occurrence" 6- or 8-hydroxyflavonols and the specific family constituents of quercetagenin and patuletin.

Pearson (1899) speaks of the Eriocaulaceae as they occur in the characteristic patana grasslands of Ceylon (Sri Lanka), noting that they become very abundant at about 5000 feet altitude, especially in swampy (marshy) places, that they, along with peat-mosses, sedges, and grasses, accumulate and provide humus in the hollows with blocked drainage, and that they, the sedges, grasses, and Hedyotis verticillaris provide abundant fibrous remains of dead vegetative parts which persist and retain water. My wife and I can attest to the truth of these observations, since we observed the identical situation on the Horton Plains earlier this year in intimate detail.

It is of interest to note that Thwaites (1839), famous early worker on the Ceylonese flora, classified the pipeworts in the family Restiaceae. In this, of course, he was not alone among early systematists.

BLASTOCAULON Ruhl.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 75 & 203. 1949; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 5. 1970; Anon., Biol. Abstr. 56 (3): B.A.S.I.C. S.28, S.89, & S.144 (1973) and 56 (6): B.A.S.I.C. S.30. 1973; Moldenke, Biol. Abstr. 56: 1259, 1261, &

3007. 1973; Moldenke, *Phytologia* 26: 455 & 500. 1973; Anon., *Biol. Abstr.* 57 (2): B.A.S.I.C. E.94. 1974; Hocking, *Excerpt. Bot. A.23*: 293. 1974.

BLASTOCAULON ALBIDUM (G. Gardn.) Ruhl.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 75 & 203. 1949; Moldenke, *Phytologia* 26: 16. 1973.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 75 & 203. 1949; Moldenke, *Phytologia* 24: 336. 1972.

BLASTOCAULON RUPESTRE (G. Gardn.) Ruhl.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 75 & 203. 1949; Moldenke, *Phytologia* 26: 455. 1973; Hocking, *Excerpt. Bot. A.23*: 293. 1974.

BLASTOCAULON SPELEICOLA Alv. Silv.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 75 & 203. 1949; Moldenke, *Phytologia* 26: 16. 1973.

CARPOTEPALA Moldenke

Synonymy: *Carptopetala* Moldenke ex Hocking, *Excerpt. Bot. A.23*: 293, sphalm. 1974.

Additional bibliography: Anon., *Biol. Abstr.* 56 (1): B.A.S.I.C. S.88 (1973) and 56 (3): B.A.S.I.C. S.28 & S.89. 1973; Moldenke, *Biol. Abstr.* 56: 75 & 1259. 1973; Moldenke, *Phytologia* 25: 246 & 504 (1973) and 28: 454 & 507. 1974; Hocking, *Excerpt. Bot. A.23*: 293. 1974.

CARPOTEPALA JENMANI (Gleason) Moldenke

Additional synonymy: *Carptopetala jenmani* (Gleason) Moldenke ex Hocking, *Excerpt. Bot. A.23*: 293, sphalm. 1974.

Additional bibliography: Moldenke, *Phytologia* 25: 246 (1973) and 28: 454. 1974; Hocking, *Excerpt. Bot. A.23*: 293. 1974.

Additional citations: GUYANA: Jerma 1032 [N. Y. Bot. Gard. type photo 5007] (W—photo of type).

COMANTHERA L. B. Sm.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 66 & 203. 1949; Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1156 & Ind. 7. 1970; Anon., *Biol. Abstr.* 56 (1): B.A.S.I.C. S.88 (1973), 56 (3): B.A.S.I.C. S.28 & S.89 (1973), and 56 (6): B.A.S.I.C. S.30 & S.161. 1973; Moldenke, *Biol. Abstr.* 56: 75, 1259, & 3007. 1973; Moldenke, *Phytologia* 26: 16 & 502. 1973; Hocking, *Excerpt. Bot. A.23*: 293. 1974.

COMANTHERA KEGELIANA (Körn.) Moldenke

Additional bibliography: Moldenke, *Phytologia* 26: 16. 1973; Hocking, *Excerpt. Bot. A.23*: 293. 1974.

Additional citations: GUYANA: Linder 40 [N. Y. Bot. Gard. type

photo 5006] (W--photo).

ERIOCAULON Gron.

Additional synonymy: Eriocaulon trimerium Mart., Erioc. Selbst. Pflanzenfam. 55. 1833.

Additional & emended bibliography: Wikstr., K. Vet. Acad. Handl. Stockh., ser. 2, 1: 73--81, pl. 3 & 4. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. [7]--[15] (repr.). 1821; Mart., Erioc. Selbst. Pflanzenfam. [3], 4, 6, 11, 22, 24, 27, 29, 33, 38, 40, 41, 51, 55, 57, 58, 60, & 63, pl. 1 (I) fig. 1--6, 1 (II) fig. 7 & 8, pl. 2 (I) fig. 1--7, & pl. 2 (II) fig. 1--6. 1833; A. Rich., Tent. Fl. Abyss. 2: 347. 1851; Anon., Journ. Linn. Soc. Lond. Bot. 20: 522. 1884; Durand & Schinz, Conspectus Fl. Afr. 5: 502--504. 1894; J. Jacks., Fl. Worcester Co., ed. 2, 56. 1894; Engl., Pflanzenw. Ost-Afr. C: 133--134. 1895; H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 304, 314, 320, 331, & 357. 1899; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 231--259, 261, & 262. 1901; Kirby, Brit. Flow. Pl. 147. 1906; Twining, Fl. Northeast. Penn. 24. 1917; Malmanche, Contrib. Étud. Anatom. Eriocaul. [thesis] 159. 1919; Hand.-Mazz. in Engl., Bot. Jahrb. 56: 585. 1921; Frémy, Bull. Soc. Linn. Normand., ser. 5, 7: 25--26. 1922; Limpr. in Fedde, Repert. Beih. 12: 314. 1922; Wangerin in Just, Bot. Jahresber. 51 (1): 168--171 [134--137]. 1923; Backer, Handb. Fl. Java 3: 5--8. 1924; Ridl., Journ. Bot. 63: Suppl. 126. 1925; Blewitt, Fl. Waterbury 39. 1926; Kräusel in Just, Bot. Jahresber. 48 (1): 244. 1926; O. C. Schmidt in Just, Bot. Jahresber. 52 (1): 156 [138]. 1927; Wangerin in Just, Bot. Jahresber. 49 (1): 160. 1927; Backer, Onkruidfl. 1: Handb. Suiker-Cult. 7: 176--178 & 844, pl. 186--188. 1928; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60--61 [42--43]. 1928; M. A. Johnstone, Pl. Ecology 65--66 & 159. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 89 & 168--171 (1929), 50 (1): 231--232 & 317 (1930), and 53 (2): 261. 1930; Alston in Trimen, Handb. Fl. Ceylon 6: 303--306. 1931; Fedde in Just, Bot. Jahresber. 49 (2): 423 (1932) and 50 (1): 684. 1932; Rydb., Fl. Prairies & Plains, pr. 1, 198, 940, & 956, fig. 107. 1932; Fedde in Just, Bot. Jahresber. 51 (2): 295--296 (1933) and 52 (1): 786. 1934; Perrier de la Bâthie, Cat. Pl. Madag. 21--22. 1934; Dole, Fl. Vt., ed. 3, 78. 1937; Alston, Kandy Fl. 76. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 29. 1940; Erdtman, Introd. Pollen Analys. 56, [57], & 236, pl. 1, fig. 10 & 11. 1943; León, Fl. Cub. 1: 279--281 & 426, fig. 112. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 2--12, 14, 15, 18, 20, 22, 27, 30, 35--37, 39, 43--45, 57, 60, 63, 66--69, 72, 76, 77, 96, 98, 100, 103, 107--127, 129, 130, 132--146, 149--153, 155, 166, 203--207, & 214. 1949; P. R. Mill., Ind. Pl. Diseases U. S. 2: 327. 1950; Scoggan, Natl. Mus. Canada Bull. 115: 146. 1950; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 163 & 523, fig. 94A. 1952; Bond, Wild Fls. Ceylon Hills xiii & 232--233. 1953; Ikuse, Pollen Grains Jap. 46. 1956; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; R. McVaugh, N. Y. State Mus. Bull. 360A: 93. 1958; Bullock, Taxon 7: 15 (1958) and 8: 171. 1959; Abeywickrama, Ceylon Journ. Sci.

Biol. 2: 140—141. 1959; Gangulee, Das, & Datta, College Bot. 1: 841. 1959; K. Jones, Taxon 9: 183 & 187. 1960; Beug, Leitfaden Pollenbest. 1: vi, 59, & 60, pl. 8, fig. 7—9, & text fig. 17a & b. 1961; Faegri & Iversen, Textb. Pollen Analys., ed. 2, pr. 1, 193 & 221. 1964; Nair, Pollen Grains West. Himal. Fl. [Asia Monogr. 5:] viii, 35, 42, & 92, pl. 15, fig. 194. 1965; E. G. Voss, Mich. Bot. 4: 17, 22, & 23. 1965; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, pr. 1, 163 & 523, fig. 94A. 1966; Faegri & Iversen, Textb. Pollen Analys., ed. 2, pr. 2, 193 & 221. 1966; Nair, Essent. Palynol. [23], fig. 43. 1966; Stuckey, Mich. Bot. 5: 105. 1966; Friedrich-Holzhammer & Roessler in Merxmüller, Prodr. Fl. Südw. Afr. 15, 159: [1]—2. 1967; Deb, Sengupta, & Malick, Bull. Bot. Soc. Bengal 22: 210. 1968; Gunawardena, Gen. & Sp. Pl. Zeyl. 206—207. 1968; B. Hansen, Dansk Bot. Ark. 27: 29—33. 1969; Quisumbing, Act. Manil. A.4 (9): 38. 1969; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 77—78, fig. 38-B. 1969; Beard, West Austr. Fl., ed. 2, 25. 1970; Hocking, Excerpt. Bot. A.16: 38—40. 1970; Matthew, Bull. Bot. Surv. India 12: 91. 1970; Saxena, Bull. Bot. Surv. India 12: 62. 1970; Thaker, Sabnis, & Bedi, Bull. Bot. Surv. India 12: 125. 1970; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. & Techn. 11: 185 & 283. 1970; Venkatareddi, Bull. Bot. Surv. India 12: 220. 1970; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, pr. 2, 163 & 523, fig. 94A. 1971; Fonseka & Vinasithamby, Prov. List Local Names Flow. Pl. Ceylon 29 & 49. 1971; Hocking, Excerpt. Bot. A.18: 444 & 445. 1971; Kulkarni, Proc. 58th Ind. Sci. Cong. 3 (4): Abstr. 438. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 1: 198, fig. 107 (1971) and pr. 2, 2: 940 & 956. 1971; Satake, Journ. Jap. Bot. 46: 109—111 [13—15], fig. 1 & 2, & 372—373 [20—21]. 1971; Thieret, Southwest. Nat. 15: 391. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156—1161 & 1163, maps 1775 & 1776, & Ind. 12. 1972; Anon., Icon. Cormoph. Sin. 1: 979. 1972; Bole, Excerpt. Bot. A.20: 83. 1972; C. A. Br., Wildfls. La. 11, 238, 240, & 243. 1972; Clifford & Ludlow, Keys Fam. & Gen. Queensl. Flow. Pl. 148 & 201. 1972; I. K. & L. F. Ferguson & Halliday, Watsonia 9: 59. 1972; Hamzah, Toha, & Van Steenis, Mount. Fl. Java 48, pl. 19, fig. 1 & 2. 1972; A. Hansen, Excerpt. Bot. A.19: 245. 1972; Hocking, Excerpt. Bot. A.19: 364. 1972; Sharma, Nucleus 15: Append. 10. 1972; R. R. Stewart in Nasir & Ali, Fl. West Pakist. Annot. Cat. 36 & 825. 1972; Thorne, Quart. Rev. Biol. 47: 370. 1972; Van den Berghen, Nat. Belg. 53 (4): 157—169. 1972; Widder, Excerpt. Bot. A.19: 259. 1972; Altschul, Drugs & Foods 19 & 352. 1973; Birks, Past & Pres. Veg. Skye 40, 87, 152, 184, 213, & 218. 1973; Anon., Biol. Abstr. 56 (1): B.A.S.I.C. S.88 (1973), 56 (3): B.A.S.I.C. S.28, S.39, & S.144 (1973), 56 (6): B.A.S.I.C. S.88, S.144, S.147, S.190, & S.256 (1973), and 56 (10): B.A.S.I.C. S.91, S.147, & S.149. 1973; C. D. K. Cook, Bull. Soc. Bot. Suisse 83: 55, 59, & 64. 1973; R. Kral, Rhodora 75: 382—384. 1973; M. D. S., Biol. Abstr. 56 (4): 1848. 1973; Moldenke, Biol. Abstr. 56: 75, 1259, 1261, 3000, 3006, 3007, & 5374. 1973; Moldenke, Phytologia 26: 455—466, 471, 473—476, 479, & 503 (1973) and 27: 63—65 & 67,

fig. 1. 1973; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 874--876 [thesis]. 1973; Robichaud & Buell, Veg. N. J. 217, 319, & 327. 1973; Ross-Craig, Drawings Brit. Fl. 31: pl. 46. 1973; W. Stone, Pl. South. N. J., pr. 2, 323--325 & 817, pl. 28, fig. 1 & 2, & pl. 64, fig. 2. 1973; Asher, Guide Bot. Period. 1 (8): 48. 1974; Hocking, Excerpt. Bot. A.23: 290, 292, & 293. 1974; Howes, Dict. Useful Pl. 86. 1974; Moldenke, Biol. Abstr. 57: 678. 1974; Moldenke, Phytologia 27: 444 & 508 (1974) and 28: 101, 192, 401, 426--430, 435, 438, 442--448, 456, 457, 460, 466, 508, & 509. 1974; H. R., Biol. Abstr. 57: 5680. 1974.

The Eriocaulon trimerium of Martius (1833) is apparently a name he proposed to use to designate all the trimerous species of the genus as a group.

Gunawardena (1968) reminds us that the generic name, Eriocaulon, is derived from the Greek, erion, meaning wool, and kaulos, meaning stem, from the woolly scapes (peduncles) of some species.

Gangulee and his associates (1959) assert that Eriocaulon may be used as an indicator that Drosera is probably present in the neighborhood. I doubt if this rule holds throughout the considerable geographic range of the genus!

Alston (1931) provides an interesting key to the Ceylonese taxa of this genus known to him at that time [the nomenclature has been brought up-to-date]:

1. Plants entirely submerged; leaves linear; heads to 1/4 inch in diameter.
2. Stems 1--3 feet long, leafy throughout; leaves 1--3 inches long.
3. Receptacular bracts hairy; heads gray or white; pistillate petals equal.....E. setaceum var. capillus-naiadis.
- 3a. Receptacular bracts glabrous; heads black; pistillate petals unequal.....E. intermedium.
- 2a. Stem less than 3 inches long; leaves 8--10 inches long.....E. fluviatile.
- 1a. Plants of wet ground; stems less than a foot long; leaves linear or lanceolate.
4. Anthers white or yellow; plants minute.....E. cinereum.
- 4a. Anthers black or greenish.
5. Receptacular bracts acuminate.
6. Heads 1/3 inch in diameter; receptacular bracts hidden by the petals.....E. longiuspe.
- 6a. Heads 1/2 inch wide; receptacular bracts not hidden by the petals.....E. robusto-brownianum.
- 5a. Receptacular bracts not acuminate.
7. Receptacular bracts (at least the outer ones) hidden by the projecting male parts.
8. Heads 1/4 to 1/2 inch wide.
9. Involucre black.....E. atratum.
- 9a. Involucre stramineous.
10. Leaves hairy.....E. subcaulescens.
- 10a. Leaves glabrous.

- 11. Leaves linear, abruptly dilated at the base....
E. ceylanicum.
- 11a. Leaves lanceolate.....E. subglaucum.
- 8a. Heads 1/2 to 1 inch wide; stems 3--4 inches long.....
E. atratum var. major.
- 7a. Receptacular bracts not hidden by the petals which are usually enclosed.
- 12. Heads with white or gray hairs; bracts dark.
- 13. Heads over 1/2 inch wide; plants often hairy.....
E. brownianum.
- [N.P. The hairy ones are now called E. nilagirense]
- 13a. Heads less than 1/2 inch wide.
- 14. Receptacle glabrous; involuclral bracts horizontal; plants minute.
- 15. Scares 1--2 inches long; heads 1/8 inch wide...
E. trimeni.
- 15a. Scares 2--4 inches long; heads 1/4 inch wide..
E. truncatum.
- 14a. Receptacle villous.
- 16. Leaves not drying red.
- 17. Involuclral bracts horizontal.
- 18. Leaves 1/3 inch wide at base; pistillate petals linear.....E. thwaitesii.
- 18a. Leaves 1/6 inch wide at base; pistillate petals oblanceolate.....E. ligulaefolium.
- 17a. Involuclral bracts reflexed.
- 19. Staminate petals all well developed, one largest.
- 20. Heads 1/6 inch wide.....E. sollyanum.
- 20a. Heads 1/4 to 1/3 inch wide; transverse veins of leaves prominent..E. collinum.
- 19a. Staminate petals all very small; transverse veins of leaves obscure..E. walkeri.
- 16a. Leaves drying red.....E. quinquangulare.
- 12a. Heads stramineous; bracts glabrous.
- 21. Florets trimerous; bracts acuminate..E. sexangulare.
- 21a. Florets dimerous; bracts acute..E. willdenovianum.

Miller (1950) lists the following fungi as attacking species of Eriocaulon in the United States: Cladochytrium replicatum Karling, in cells of old leaves, a leaf-rot (New York), Endophlyctis texana Karling, in cells of old leaves (Texas), Tolyposporium eriocauli Clint., a seed smut (Connecticut, Massachusetts, and New Hampshire), and Ustilago eriocauli (Mass.) Clint., a seed smut (Connecticut, Massachusetts, and New Hampshire). He says of the genus as a whole "Rushlike perennial herbs in shallow water or bogs throughout the Eastern and Central States and southward; sometimes used in bog gardens." The first, third, and fourth of the fungi probably are attackers of E. pellucidum Michx. since it is the only species of the genus in the states

mentioned in any abundance. In Texas there are six taxa represented.

The Partch 69-42, distributed as an Eriocaulon sp., is actually Syngonanthus pittieri Moldenke.

ERIOCAULON ABYSSINICUM Hochst.

Additional synonymy: Eriocaulon minimum Ruhl. apud N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 258, in syn. 1901 [not E. minimum Lam., 1791]. Eriocaulon sexangulare A. Rich. apud N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 258, in syn. 1901.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 502 & 503. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 234, & 257-258. 1901; Anon., Biol. Abstr. 56 (1): B.A.S.I. C. S.88. 1973; Moldenke, Biol. Abstr. 56: 75. 1973; Moldenke, Phytologia 26: 456 (1973) and 28: 456 & 457. 1974; Hocking, Excerpt. Bot. A.23: 293. 1974.

Brown (1902) cites Schimper 1944 and Quartin-Dillon s.n. from Ethiopia and asserts that the species occurs "Also in South Africa". He describes it as inhabiting "inundated places" and "on the mountain plains". Lely found it growing in running water on rocks, flowering and fruiting in October, and describes it as "a small sedge...4 inches" tall. It is, of course, not a sedge.

Additional citations: NIGERIA: Northern: Lely P.786 (E-1755950).

ERIOCAULON ACHITON Körn.

Additional & emended bibliography: Fyson, Journ. Indian Bot. 2: 202-204. 1921; Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Venkataredd, Bull. Bot. Surv. India 12: 220. 1970; Moldenke, Phytologia 24: 339-340. 1972; Sharma, Nucleus 15: Append. 10. 1972.

Additional illustrations: Fyson, Journ. Indian Bot. 2: 203. 1921.

Venkataredd (1970) reports this species as "occasional", flowering in August and September, and cites his no. 99102. Sharma (1972) reports a chromosome count of 30.

Additional citations: BANGLADESH: W. Griffith 5576 (Pd). THAILAND: Larsen, Larsen, Nielsen, & Santisuk 32341 (Ac).

ERIOCAULON ADAMESII Meikle

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111 & 203. 1949; Moldenke, Phytologia 26: 456. 1973.

ERIOCAULON AEQUINOCTIALE Ruhl.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 63 & 203. 1949; Moldenke, Phytologia 24: 340. 1972.

ERIOCAULON AFRICANUM Hochst.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5:

502. 1894; Friedrich-Holzhammer & Roessler in Merxmüller, Prodr. Fl. Südw. Afr. 15, 159: 2. 1967; Moldenke, Phytologia 24: 340. 1972.

ERIOCAULON AFZELIANUM Wikstr.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 502. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 236 & 250—251. 1901; Moldenke, Phytologia 26: 456. 1973.

Brown (1901) cites only Afzelius s.n. and Scott-Elliott 4339 from Sierra Leone and Barter 1019 from Northern Nigeria.

ERIOCAULON ALPESTRE Hook. f. & Thoms.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Phytologia 25: 247. 1973.

Material of this species has been misidentified and distributed in some herbaria as E. quinquangulare L.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia 5—6000 ped.] (Pd). State undetermined: Collector undetermined s.n. [Narainhetty, 22d Oct. 1802] (Pd).

ERIOCAULON ALTOGIBBOSUM Ruhl.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 203. 1949; Moldenke, Phytologia 24: 341. 1972.

ERIOCAULON AMBOENSE Schinz

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232 & 258—259. 1901; Friedrich-Holzhammer & Roessler in Merxmüller, Prodr. Fl. Südw. Afr. 15, 159: [1]—2. 1967; Moldenke, Phytologia 24: 341. 1972.

Friedrich-Holzhammer & Roessler (1967) cite for this species only the type collection, Schinz 859, from Uashitenga and Giess & Leipert 7608 and Merxmüller & Giess 2079b and 2134 from Namibia. Brown (1901) cites only the original collection, Schinz 859, from Namibia. He has modified the original description of the species and notes that "I do not find that the bracts are lacerate as stated in the original description, and it is only the outermost or involucre bracts that are sometimes obtuse; both in the type specimen which Prof. Schinz has kindly allowed me to examine and in the example at Kew they are as described above. I find only 2 sepals present in the female flowers, but the male flowers seem to be very variable in the number of their parts, some having 2 sepals, 3 petals, and 4 stamens, others 2 sepals, 3 petals and 6 stamens, whilst a few have 3 sepals, 3 petals and 6 stamens."

ERIOCAULON ANDONGENSE Welw.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233 & 247—248. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 118 & 203. 1949; Moldenke, Phytologia 24: 341. 1972.

Brown (1901) cites Welwitsch 2442, 2443, & 2443b from wet places by cataracts and "spongy rocky places by the springs on the gigantic rocks" and "spongy places on the higher rocks" in Angola, at altitudes of 2400 to 3800 feet. He comments that "This is very similar to E. Buchananii, Ruhland, but the heads are not so globose, being more or less flattened at the base, and the sepals of the female flowers have a rather long acutely acuminate point, whilst in E. Buchananii the point of the sepals is very short and never very acute."

ERIOCAULON ANGUSTIFOLIUM Körn.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 203. 1949; Moldenke, Phytologia 25: 121 (1973) and 26: 30. 1973.

ERIOCAULON ANNAMENSE H. Lecomte

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 203. 1949; Moldenke, Phytologia 25: 247. 1973.

ERIOCAULON ANNUUM Milne-Redhead

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 117, 119, & 203. 1949; Moldenke, Phytologia 24: 341. 1972.

ERIOCAULON ANTUNESII Engl. & Ruhl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 235 & 242—243. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 118 & 203. 1949; Moldenke, Phytologia 24: 341-342. 1972.

Brown (1901) cites only the original collection, Antunes 139, from Hufla, Angola.

ERIOCAULON APICULATUM H. Lecomte

Additional bibliography: Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Phytologia 24: 342. 1972.

Perrier de la Bâthie (1934) says that this plant grows in wet places along the shores of the Simiane River in Madagascar.

ERIOCAULON AQUATICUM (J. Hill) Druce

Emended synonymy: Eriocaulon septangulare L. ex Mart., Selbst. Pflanzenfam. 11. 1833.

Additional & emended bibliography: Wikstr., K. Svensk. Vet. Acad. Handl. Stockh., ser. 2, 1: 73 & 75. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. [repr.] [7] & 9. 1821; Mart., Erioc. Selbst. Pflanzenfam. 11, 22, 38, & 58, pl. 2 (II), fig. 1—6. 1833; Kirby, Brit. Flow. Pl. 147. 1906; M. A. Johnstone, Pl. Ecology 65—66 & 159. 1928; Rydb., Fl. Prairies & Plains, pr. 1, 198 & 940, fig. 107. 1932; R. McVaugh, N. Y. State Mus. Bull. 360A: 93. 1958; Beug, Leitfaden Pollenbest. 1: vi, 59, & 60, pl. 8, fig. 7—9, text fig. 17a & b. 1961; Rydb., Fl. Prairies & Plains, pr. 2, 1: 198,

fig. 107 (1971) and pr. 2, 2: 940. 1971; I. K. & L. F. Ferguson & Halliday, *Watsonia* 9: 59. 1972; Sharma, *Nucleus* 15: Append. 10. 1972; Thorne, *Quart. Rev. Biol.* 47: 370. 1972; Van den Berghen, *Nat. Belg.* 53 (4): 157--169. 1972; Birks, *Past & Pres. Veg. Skye* 40, 87, 152, 184, 213, & 218. 1973; M. D. S., *Biol. Abstr.* 56: 1848. 1973; Ross-Craig, *Drawings Brit. Pl.* 31: pl. 46. 1973; Moldenke, *Phytologia* 26: 456 (1973) and 28: 456 & 460. 1974.

Additional illustrations: Mart., *Erioc. Selbst. Pflanzenfam.* pl. 2 (II), fig. 1--6. 1833; Beug, *Leitfaden Pollenbest.* 1: 59, text fig. 17 a & b, & pl. 8, fig. 7--9. 1961; Ross-Craig, *Drawings Brit. Pl.* 31: pl. 46. 1973.

Birks (1973) states that this species has as its principal habitat the *Magnocaricion elatae* ecologic association on the Isle of Skye as it does the *Eriocauleto-Lobelietum* of Blanquet & Tüxen (1952) and the *Eriocaulum septangularis* of Schoof - Van Pelt & Westhoff (1969) within the alliance *Littorellum* in Ireland. He claims that no fossil *Eriocaulon* pollen has yet been identified on Skye. Johnstone (1928) avers that it occurs in some morainic ponds on the moor of Rannoch, Isle of Skye, "the only other British station for which is in the west of Ireland".... "In western Ireland and in the Hebrides there exist a few species whose nearest other stations are in North America. The list includes only these -- the blue-eyed grass (*Iridaceae*), pipewort, two other water plants and an orchid....puzzling....One theory explains them by means of a long-lost continent, which bridged the Atlantic between Ireland and America." In more recent years Wegener's "Floating Continent" theory is becoming more popular in explaining situations such as this.

Sharma (1972) reports the chromosome counts of 60 and 64.

Additional citations: MOUNTED CLIPPINGS: Kunth, *Enum. Pl.* 3: 540. 1841 (W).

ERIOCAULON AQUATILE Körn.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 76 & 203. 1949; Moldenke, *Phytologia* 24: 342. 1972.

ERIOCAULON ARGENTINUM Castell.

Additional bibliography: Moldenke, *Phytologia* 26: 179--180, 458, & 460. 1973.

Krapovickas and his associates found this plant growing "en pantano, al borde de una isleta de selva", flowering in December, and distributed it as *E. crassiscapum* Bong.

ERIOCAULON ARISTATUM H. Hess

Additional & emended bibliography: N. E. Br. in *Thiselt.*-Dyer, *Fl. Trop. Afr.* 8: 234 & 249. 1901; Friedrich-Holzhammer & Roessler in *Merxmüller, Prodr. Fl. Südw. Afr.* 15, 159: [1] & 2. 1967; Moldenke, *Phytologia* 24: 343. 1972.

Friedrich-Holzhammer & Roessler (1967) cite only *Dinter 7220* and *Volk 1806* from Namibia, noting that the type is from Angola.

Brown (1901) cites only Welwitsch 2444 from Huila, Angola.

ERIOCAULON ATABAFENSE Moldenke

Additional bibliography: Moldenke, Phytologia 24: 343. 1972.

Additional citations: VENEZUELA: Amazonas: Steyermark & Bunting 103228 (S).

ERIOCAULON ATRATUM Körn.

Synonymy: Eriocaulon stratum Gunawardena, Gen. & Sp. Pl. Zeyl. 206, sphalm. 1968.

Additional & emended bibliography: H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 357. 1899; Fyson, Journ. Indian Bot. 2: 310, pl. 26. 1921; Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130 & 203. 1949; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Moldenke, Phytologia 26: 180 (1973) and 28: 456 & 457, 1974.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 26. 1921.

Thwaites (1864) cites Thwaites C. P. 61 for this species.

Pearson (1899) refers to it as common above 5000 feet altitude in Sri Lanka, citing numbers 60 (from 6200 feet, with straw-colored involucre bracts), 71 (the bracts brown with black edges), and 63 (from 8000 feet). He states that "in the type they [the involucre bractlets] are 'glossy-black'", concluding that "These [the numbers cited above] appear to be forms of E. atratum". The Van Beusekom describe the plants as having light-green leaves and grayish-white flowers, while Grierson says "flower-stems 10--20 cm. tall, heads 4--5 mm. diameter, hemispheric, bracts blackish, flowers white".

The species has been collected in muddy places along paths and in shady places among moist rocks at streamsides, "locally abundant", at 1200--4500 m. altitude, flowering in March and August. The Thwaites C. P. 61, referred to above, is actually a mixture with E. ceylanicum Körn. and E. subglaucum Ruhl. In my experience many of Thwaites Ceylon Plants numbers are mixtures of several taxa. This has led to serious misconceptions of species' characters in the past.

Additional citations: SRI LANKA: Collector undetermined s.n. [Maskeliya, March 1885] (Pd), s.n. [Adam's Peak, 6.iii.99] (Pd); Grierson 1043 (Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28271a (W), 28280 (W); G. M. Silva s.n. [Adam's Peak, 15/5/1906] (Pd); J. M. Silva s.n. [29.IV.26] (Pd); Sumithraarachchi DBS.114 (Z); Thwaites C.P. 61 [Gardner O.C.932], in part (Pd); Van Beusekom & Van Beusekom 1543 (Pd).

ERIOCAULON ATRATUM var. MAJOR Thwaites

Additional synonymy: Eriocaulon caulescens Hook., in herb. [not E. caulescens Kunth, 1971, nor Poir., 1813, nor Salzm., 1959, nor

Willd., 1841].

Additional bibliography: H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 357. 1899; Wangerin in Just, Bot. Jahresber. 51 (1): 169 & 170 [135 & 136]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 305. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130 & 203. 1949; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Moldenke, Phytologia 25: 238, 239, & 248 (1973) and 28: 456. 1974.

Gunawardena (1968) reminds us that E. philippo-coburgi, a synonym of E. atratum var. major, was named in honor of the Prince of Saxe-Coburg-Gotha.

The type of E. atratum var. major was collected by George Henry Kendrick Thwaites (C.P. 131) and is deposited in the Peradeniya herbarium. It is described by him as "Parce caulescens. Folia vaginis valde dilatatis. Sepala exteriora multum latiora quam in E. cristato, cui alioquin haec species simillima est".

Pearson (1899) cites his no. 77 from the Ceylonese patana grasslands at 8000 feet altitude. Recent collectors have found the plant in swampy patana grasslands, especially by streams, and in the transition zone between wet panata and forest, at 1500—2300 meters altitude, flowering in January and March, the flowers described as "white". Jayasuriya & Sumithraarachchi report it as "common on sandy-rocky island in river"

Material has been misidentified and distributed in some herbaria as E. longicuspe Hook. f.

Additional citations: SRI LANKA: Alston 945 (Pd); Amaratunga 1547 (Pd); Fyson s.n. [1927-8] (Pd); Hoogland 11503 (Pd); Jayasuriya & Sumithraarachchi 1567 (Ld); F. Lewis s.n. [Kunadiyaparamila, Xmas 1917] (Pd); A. M. Silva s.n. [21/4/06] (Pd, Pd); Thwaites C.P. 131 (Pd—type), 940 (Pd).

ERIOCAULON ATRUM Nakai

Additional & emended bibliography: Satake, Journ. Jap. Bot. 46: 110 & 111 [13 & 15]. 1971; Moldenke, Phytologia 25: 248. 1973.

ERIOCAULON AUSTRALASICUM (F. Muell.) Körn.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 203. 1949; Moldenke, Phytologia 24: 344. 1972.

ERIOCAULON AUSTRALE R. Br.

Additional bibliography: Moldenke, Phytologia 25: 232 & 248. 1973.

Durrington found this plant growing in sandy soil at the edge of swampy sedgeland with Todea barbata, flowering and fruiting in February.

Additional citations: AUSTRALIA: Queensland: Durrington AQ. 0009162 (N).

ERIOCAULON BARBA-CAPRAE Fyson

Additional & emended bibliography: Fyson, Journ. Indian Bot. 2: 197, pl. 4. 1921; Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 203. 1949; Moldenke, Phytologia 24: 345. 1972.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 4. 1921.

ERIOCAULON BARBEYANUM Ruhl.

Additional bibliography: Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 203. 1949; Moldenke, Phytologia 24: 345. 1972.

Alston (1931) asserts that, in his opinion, this taxon may be conspecific with E. fluviatile Trimen.

ERIOCAULON BAURI N. E. Br.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 250. 1901; Moldenke, Phytologia 25: 248. 1973.

ERIOCAULON BEAUVERDI Moldenke

Additional synonymy: Eriocaulon beauverdi (Beauverd) Moldenke ex Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156. 1970.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 203. 1949; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Moldenke, Phytologia 24: 346 (1972) and 28: 456. 1974.

ERIOCAULON BIFISTULOSUM Van Heurck & Muell.-Arg.

Additional & emended bibliography: Anon., Journ. Linn. Soc. Lond. Bot. 20: 522. 1884; J. G. Baker, Journ. Linn. Soc. Lond. Bot. 21: 450. 1885; Durand & Schinz, Consp. Fl. Afr. 5: 502. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 234, & 239-241. 1901; Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Phytologia 26: 457. 1973.

Brown (1901) cites only Barter 1021 from Northern Nigeria and Schweinfurth 2476 and 3-244 from "British East Africa" [Kenya?]. He comments that "After repeated dissection I am quite unable to find any definite character whereby to distinguish E. bifistulosum from E. Schweinfurthii; the heads of the latter are rather larger and darker than those of E. bifistulosum, and the peduncles appear to be stouter in the dried state, but thin transverse sections swollen out in water exhibit no difference in character or size. Such differences as are observable between them I believe to be due to vigour of growth and perhaps some difference in the food supply. The flowering bracts appear to be sometimes entirely glabrous, although usually those in the centre of the heads possess some hairs, which are easily overlooked. The hairs may be very deciduous, or the variation in pubescence and in the length of the peduncles may depend upon the depth of the water in which the plant grows submerged. Schweinfurth's 2476 appears to have

grown in shallow water, is less vigorous than the other specimens and the stem below the leaves is very short or almost wanting in the examples seen, but I cannot find any real structural difference. Sometimes the female flower are all in the central part of the head and the males outside, in other examples the female flowers are central and the males outside [sic]. E. bifistulosum and E. limosum were both founded upon Barter's 1021.

"It is not improbable that E. bifistulosum, together with E. fluitans, Baker, from Madagascar, should be united with the Brazilian E. melanocephalum, Kunth; there is, however, a slight difference in the structure of the peduncles and in the texture of the bracts and sepals. But they require further investigation from a larger series of specimens than is at my command before a correct decision can be made. From the Indian E. setaceum, Linn. (which it closely resembles in general appearance) the glabrous petals of E. bifistulosum readily distinguish it. The Australian plant named E. setaceum by Bentham is quite different in floral structure from all the species above mentioned."

Perrier de la Bâthie (1934) says that "Baker [Journ. Linn. Soc. 21: 450] fait de cette espèce [E. fluitans J. G. Baker] un synonyme de E. melanocephalum Kunth (E. aquaticum Sagot) de la Guyanne et du Brésil."

ERIOCAULON BLUMEI Körn.

Additional bibliography: Backer, Handb. Fl. Java 3: 5—6. 1924; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 144 & 204. 1949; Moldenke, Phytologia 24: 346. 1972.

Backer (1924) is of the opinion that E. macrophyllum Ruhl. is conspecific with E. blumei Körn.

ERIOCAULON BOMBAYANUM Ruhl.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 24: 346. 1972.

ERIOCAULON BONGENSE Engl. & Ruhl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233 & 246—247. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 109, 111, 112, 118, & 204. 1949; Anon., Biol. Abstr. 56 (1): B.A.S.I.C. S.88. 1973; Moldenke, Biol. Abstr. 56: 75. 1973; Moldenke, Phytologia 26: 457. 1973; Hocking, Excerpt. Bot. A.23: 293. 1974.

Brown (1901) cites Barter 1019a from Northern Nigeria and Schweinfurth 2539 and 2722 from "British East Africa" [Kenya?].

ERIOCAULON BONI H. Lecomte

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 204. 1949; Moldenke, Phytologia 26: 18. 1973.

ERIOCAULON BRACHYPEPLON Körn.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 150 & 204. 1949; Moldenke, Phytologia 24: 347. 1972.

ERIOCAULON BREVIPEDUNCULATUM Merr.

Additional bibliography: Moldenke, Phytologia 24: 347 (1972), 25: 233 (1973), and 26: 18. 1973.

ERIOCAULON BREVISCAPUM Körn.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Saxena, Bull. Bot. Surv. India 12: 62. 1970; Moldenke, Phytologia 26: 457 (1973) and 28: 444. 1974.

Saxena (1970) describes this plant as "Rare along riversides, partly in water", flowering in June, and cites Saxena 4614 from Madhya Pradesh, India.

ERIOCAULON BROMELIOIDEUM H. Lecomte

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 204. 1949; Moldenke, Phytologia 26: 18. 1973.

ERIOCAULON BROWNIANUM Mart.

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 29. 1833; H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 357. 1899; Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 305. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Bond, Wild Fls. Ceylon Hills xiii, 232, & 233. 1953; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Fonseka & Vinasithamby, Prov. List Local Names Flow. Pl. Ceylon 49. 1971; Hamzah, Toha, & Van Steenis, Mount. Fl. Java 48, pl. 19, fig. 2. 1972; Moldenke, Phytologia 26: 180 (1973) and 28: 447. 1974.

Additional illustrations: Bond, Wild Fls. Ceylon Hills 233. 1953; Hamzah, Toha, & Van Steenis, Mount. Fl. Java pl. 19, fig. 2 (in color). 1972.

Hamzah, Toha, & Van Steenis (1972) record this species from Java and Sumatra and describe it as growing to 1 meter in height, the leaves 10—80 cm. long, 0.5—2 cm. wide, the "stem" and leaves "fine hairy to a degree". They continue that it is found "In Java in swamps and on marshy banks of lakes (rantjas), only known from Mts Patuha....Pèngalèngan.....& Dièng, where this conspicuous plant is common, even gregarious, often together with Sphagnum and associated with Machaerina, Xyris...., Juncus...., Rhynchospora....., and Scirpus....., at 1600—2300 m. Also in SE. Asia and in Atjeh, and in the mountain swamps and lakes of Sumatra's Westcoast."

Bond (1953) confuses this taxon with the similar but hairy E.

nilagirensis Steud., comparing it with the totally different E. truncatum Hamilt., noting that both occur in swampy ground up to the highest elevations in the Ceylonese hills and both are in flower "most of the year" — the former, he says, grows in large tufts of hairy grayish leaves and with flower-stems (scapes) up to 2 feet tall (the heads $3/4$ inch wide), while the latter is a delicate plant with bright-green leaves and the scapes only 2—3 inches tall (the heads only $1/8$ inch wide). My wife and I collected both species in the Horton Plains area of Sri Lanka earlier this year and found them unmistakably distinct.

Thwaites cites his C.P. 377 from 7000 feet altitude, while Pearson (1899) cites his no. 73 from 5600 feet and no. 76 from 7200 feet, commenting that the species is "common above 5000 feet". My wife and I found E. nilagirensis very common, but the true E. brownianum only in scattered localities.

Gunawardena (1968) reminds us that the species is named in honor of Robert Brown (1773—1858), who was naturalist on the "Investigator" to Australia in 1801, returning to England after 4 years to become Librarian of the Linnaean Society in London, discoverer of the cell nucleus and Brownian movement, author of many floras, such as those of Australia and Tasmania.

Finseka & Vinasithamby (1971) record the common name, "lady's hatpin", for this plant in Sri Lanka. Recent collectors have found it growing in moist patches of grass and in sunny hummocky swamp-meadows by ponds, at altitudes of 5600—7200 feet in Sri Lanka, flowering in February and August.

The C[eylon] P[lants] 378, cited below, is a mixture with E. brownianum var. latifolium Moldenke and with E. nilagirensis Steud. It was originally misidentified and distributed as E. wightianum Mart. The Amaratunga 418 and J. M. Silva s.n. [29.IV.26], distributed as E. brownianum are actually var. latifolium Moldenke, while Collector undetermined s.n. [Knuckles, 1881], s.n. [Dumbalgala Hill, Sept. 1888], & s.n. [Maha Eliya, 6.V.96], Comanor 980, Cramer 3149 & 3259, Mueller-Dombois 67070941, J. M. Silva s.n. [Horton Plain, 20/5/1911], N. D. Simpson 9427, and J. C. Willis s.n. [Horton Plains, 26/1/06] are E. nilagirensis Steud.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia, 3-5000 ped.] (Pd). State undetermined: Wight 2859 (Pd). BANGLADESH: N. Griffith 5574 (Pd). SRI LANKA: Amaratunga 1816 (Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28293 (Ac, Gz, Kh, Ld, Pd), 28962 (Ac, Gz, Kh, Ld, Pd, Z); Thwaites C.P. 377 (Pd, Pd), 378, in part (Pd, Pd); L. C. Wheeler 12374 (Pd, W-2716156).

ERIOCAULON BROWNIANUM var. LATIFOLIUM Moldenke

Additional bibliography: Moldenke, *Phytologia* 26: 180. 1973.

Recent collectors have encountered this plant in wet patana grassland to forest transition zone, in marshes and ditches, in "sunny, hummocky, swampy meadows by pond", and at the foot of

sandstone cliffs in a grassy swamp, at altitudes of 3100 to 7000 feet, flowering and fruiting in February, March, and June. Maxwell & Jayasuriya refer to it as a "common marsh plant", while Hepper describes it as a "tufted herb" with erect leaves and whitish inflorescences. It has been widely confused with typical E. brownianum Mart. and so distributed in herbaria. The type collection is a mixture with E. nilagirensis Steud.; in fact, a great many of the Thwaites C.P. numbers are mixtures of 2 or 3 species.

Additional citations: SRI LANKA: Amaratunga 418 (Pd); Hepper 418 (Pd, W—2719994); Hoogland 11502 (Pd); Maxwell & Jayasuriya 869 (Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28297 (Ac, Gz, Kh, Ld, Pd, Z), 28306 (Pd); J. M. Silva s.n. [29. IV.26] (Pd); Thwaites C.P. 378, in part (Pd—isotype, Pd—isotype).

ERIOCAULON BUCHANANII Ruhl.

Emended synonymy: Eriocaulon buchanani Ruhl. ex N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233. 1901.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 234, 247, & 248. 1901; Moldenke, Phytologia 26: 18. 1973.

Brown (1901) cites Buchanan 1168, Cameron 50, Kirk s.n., and Whyte s.n. from "British Central Africa" [Malawi?] and "Nyasa-land" [Malawi] at altitudes of 3800—4000 feet.

ERIOCAULON BUERGERIANUM Körn.

Additional & emended bibliography: Wangerin in Just, Bot. Jahresber. 49 (1): 160. 1927; Fedde in Just, Bot. Jahresber. 49 (2): 423. 1932; Satake, Journ. Jap. Bot. 46: 373 [21]. 1971; Moldenke, Phytologia 24: 348. 1972.

Additional illustrations: Hayata, Icon. Pl. Formos. 10: fig. 29. 1921.

ERIOCAULON CABRALENSE Alv. Silv.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1932; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Phytologia 26: 18. 1973.

Additional illustrations: Alv. Silv., Archiv. Mus. Nac. Rio Jan. 23: pl. 4. 1921.

ERIOCAULON CAESIUM Griseb.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 57 & 204. 1949; Moldenke, Phytologia 24: 348 (1972) and 25: 159. 1973.

ERIOCAULON CAPITULATUM Moldenke

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 30 & 204. 1949; Moldenke, Phytologia 24: 349. 1972.

ERIOCAULON CARAJENSE Moldenke, Phytologia 27: 63--65, fig. 1. 1973.

Bibliography: Moldenke, Phytologia 27: 63--65, fig. 1 (1973) and 28: 438. 1974.

Illustrations: Moldenke, Phytologia 27: 64, fig. 1. 1973.

Citations: BRAZIL: Pará: Cavalcante 125 [MG. 36706] (Z--type).

ERIOCAULON CAULIFERUM Mak.

Additional & emended bibliography: Satake, Journ. Jap. Bot. 46: 372 [20]. 1971; Moldenke, Phytologia 24: 349. 1972.

ERIOCAULON CEYLANICUM Körn.

Additional synonymy: Eriocaulon ceylanicum var. subacaulescens Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929

Additional bibliography: H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 357. 1899; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 168--169 [134--135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303--305. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206 & 207. 1968; Fonseka & Vinasithamby, Prov. List Local Names Flow. Pl. Ceylon 49. 1971; Moldenke, Phytologia 26: 457 (1973) and 28: 456. 1974.

Recent collectors have found this plant growing in hummocky ground of depressions in wet black patana grasslands near meandering streams in poorly drained areas with Ischaemum as the chief cover, in meadows, and in moist seeps at the edge of deep woods, at altitudes of 6450 to 7200 feet, flowering in March, May, and June, and fruiting in June. Hoogland reports it as "common" in wet patanas, while Maxwell & Jayasuriya refer to it as "very common" in marshes. These latter collectors describe the flowers as white or (on the United States National Herbarium sheet, doubtless through some error in transcription) as "violet". Fonseka & Vinasithamby (1971) record the common name, "lady's hatpin".

Pearson (1899) cites his no. 70 from an altitude of 7200 feet on the Horton Plains -- an area where my wife and I also found it quite common earlier this year. Thwaites C.P. 61 is a mixture with E. atratum Körn. and E. subglaucum Ruhl.

The Eriocaulon cristatum var. Thwaites and E. cristatum var. bracteis floralibus denticulatis et longiuscule cuspidato-acuminatis Thwaites & Hook. f., previously cited as synonyms of E. ceylanicum, prove, instead, to belong in the synonymy of E. longiuscule Hook. f.

Additional citations: SRI LANKA: W. Ferguson 23 (Pd); Gould & Cooray 13787 (Pd), 13811 (Ca--1376072); Hoogland 11505 (Pd); Koyama & Herat 13640 (Pd); Maxwell & Jayasuriya 877 (Pd, W--2760939); Mueller-Dombois & Comanor 67070901 (Pd); A. M. Silva s.n. [Eliya lake, 9/4/66] (Pd); J. M. Silva s.n. [Horton Plain, 25/5/1911] (Pd, Pd); Thwaites C.P. 61, in part (Pd); J. C. Willis s.n. [Hor-

ton Plains, 4/5/06] (Pd).

ERIOCAULON CIMEREUM R. Br.

Emended synonymy: Eriocaulon tenue Buch.-Ham. ex Wall., Numer. List 207, no. 6073, hyponym. 1832 [not E. tenue Humb. & Bonpl., 1817, nor H.B.K., 1816, nor Humboldt & Kunth, 1841, nor Kunth, 1826].

Additional & emended bibliography: N. E. Er. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 259. 1901; Backer, Handb. Fl. Java 3: 7. 1924; Wangerin in Just, Bot. Jahresber. 49 (1): 160, 1927; Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: 177, 178, & 844, pl. 186. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 304. 1931; Fedde in Just, Bot. Jahresber. 49 (2): 423 (1932) and 51 (2): 296. 1933; Alston, Kandy Fl. 76. 1938; Ikuse, Pollen Grains Jap. 46. 1956; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Nair, Pollen Grains West. Himal. Pl. [Asia Monogr. 5:] 35, 42, & 92, pl. 15, fig. 194. 1965; Nair, Essent. Palynol. [23], fig. 43. 1966; Deb, Sengupta, & Malick, Bull. Bot. Soc. Bengal 22: 210. 1968; Gunawardana, Gen. & Sp. Pl. Zeyl. 207. 1968; Quisumb., Act. Manil. A.4 (9): 38. 1969; Beard, West Austral. Pl., ed. 2, 25. 1970; Matthew, Bull. Bot. Surv. India 12: 91. 1970; Saxena, Bull. Bot. Surv. India 12: 62. 1970; Venkatarredd, Bull. Bot. Surv. India 12: 220. 1970; Thieret, Southw. Nat. 15: 391. 1971; Hocking, Excerpt. Bot. A.19: 364. 1972; Rouleau, Taxon Index Vol. 1-20 part 1: 139. 1972; Sharma, Nucleus 15: Append. 10. 1972; R. R. Stewart in Nasir & Ali, Fl. West Pakist. Annot. Cat. 36. 1972; C. D. K. Cook, Bull. Soc. Bot. Suisse 83: 55, 59, & 64. 1973; Moldenke, Phytologia 26: 457 & 462. 1973; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 874-875 [thesis]. 1973; H. R., Biol. Abstr. 57: 5680. 1974; Moldenke, Phytologia 28: 443 & 448. 1974.

Additional illustrations: Hayata, Icon. Pl. Formos. 10: fig. 27. 1921; Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: pl. 186. 1928; Nair, Pollen Grains West. Himal. Pl. [Asia Monogr. 5:] pl. 15, fig. 194. 1965; Nair, Essent. Palynol. [23], fig. 43. 1966.

Recent collectors have found this plant growing in rice fields, in sandy mud at the edge of a tank reducing in area, and in very moist soil in general, flowering in February, August, September, and December. Hepper & Jayasuriya report it as "abundant all around many of the tanks [in Ceylon] as small green rosettes with short grayish inflorescence", Cramer says that he found it "common along borders of villu among short grasses" at sealevel, the "heads snow-white", and Amaratunga calls it a "bad weed in wet ricefields. Cooray refers to the inflorescence as "gray-white", which is also the description that my wife and I would give of it in our experience -- certainly we have never seen the heads "snow-white" [unless one is speaking of snow as it appears a few days after it has fallen on the streets of a big modern city! The scape (peduncle) is described as 4-angled.

Matthew (1970) describes this plant as "Tiny herbs occurring in gregarious masses in low-lying areas [with] copious masses

of flowers from December onwards", Saxena (1970) asserts that it is "Common in marshy places", flowering in September and October, and cites Saxena 10178 from Madhya Pradesh, India, while Venkatareddi (1970) found it to be "Frequent", flowering in October and November, citing his no. 101042. Deb and his associates cite Sengupta 1114 from Bhutan. Stewart (1972) reports it common in the ricefields of Pakistan at altitudes of 5000 to 7000 feet. Markos describes the California plants as "submerged except for upper part of the flowering stems [peduncles]."

Hepper & Jayasuriya refer to E. cinereum as a "small tufted herb, leaf-bases bright pink, inflorescence whitish", but the pink leaf-bases are not evident to me on their specimens (when dried). They found the plant growing in the "open" with sparse vegetation of Xyris and Utricularia. Hepper also encountered it on a "steep slope with wet flush and melastomaceous shrubs." Sharma (1972) reports the chromosome count as 32 and 18, the latter number for the E. sieboldianum form.

Cook (1973) reports on his Italian find of this species as follows: "It was found in shallow water in ricefields at Gréggio and at the Stazione di Riscicoltura. On 1 August 1957, H. Merxmüller and W. Wiedmann collected three immature and thus indeterminable rosettes of Eriocaulon near Gréggio (specimens deposited in the herbarium of the Botanische Staatssammlung München, M). In 1972 we revisited this area and found abundant mature E. cinereum. My determination has been checked by T. Koyama, D. Meikle and H. N. Moldenke. I have examined Merxmüller's material and there is no reason to doubt that it is also E. cinereum."

"E. cinereum is a common, pantropical weed of ricefields so it is not possible to give the origin of the Vercelli plants. However, it is possible to say that it has been in the Vercelli region for at least 15 years. Among the normal E. cinereum we collected two somewhat smaller dark-headed plants. Unfortunately, our material was inadequate for certain identification but the possibility exists of a second species being present." Growing with it were Murdannia blumei (Hassk.) Brenan, Rotala densiflora (Roth) Koehne, and R. ramosior (L.) Koehne, all also new records for Europe, and Elatine ambigua Wight and Sparganium erectum ssp. microcarpum (Neuman) Domin, both new for Italy. "Rice has been cultivated around Vercelli since at least 1475."

Material of E. cinereum has been misidentified and distributed in some herbaria as E. trimeni Hook. f. On the other hand, the Amaratunga 1759, distributed as E. cinereum, is actually E. truncatum Hamilt. and Santapau 13316 is a mixture with E. elenorae Fyson.

Additional citations: CALIFORNIA: Stanislaus Co.: Markos s.n. [Krause rice fields, Modesto, Sept. 18, 1947] (W—1976517). SIK-KIM: J. D. Hooker s.n. [1-5000 ped.] (Pd). PAKISTAN: Northwest Frontier: Nath 4035 (Kh). INDIA: Kerala: Santapau 13316, in part (E—1624131); Stocks, Law, &c. s.n. [Malabar & Concan] (Pd). Ut-

tar Pradesh: Collector undetermined 336 (Pd). State undetermined: T. Thomson s.n. [Ganget. Sup.] (Pd). BANGLADESH: Griffith 5565 (Pd); Hooker & Thomson s.n. [Chittagong, 0-1000 ped.] (Pd). SRI LANKA: Alston s.n. [8.IX.26] (Pd); Amaratunga 1149, in part (Pd), 1397 (Pd), 2208 (Pd); Collector undetermined s.n. [Dambulla Rock, 20 Dec. 1881] (Pd), s.n. [Pinnawala Balangoda, Sept. 1895] (Pd); Cooray 69121107R (Pd); Cramer 3160 (Pd); G. Gardner s.n. [Thwaites C.P. 795, Rambodda] (Pd); Hepper & Jayasuriya 4622 (W-2720107), 4628 (Pd); Moldenke & Moldenke 28194 (Ld); Moldenke, Moldenke, Jayasuriya, & Albert 28320 (Ld, Pd); Thwaites C.P. 795 [Mawanelle] (Pd). CHINA: Kwangtung: Sampson & Hance 9666 (Pd). AUSTRALIA: New South Wales: Leichhardt s.n. [Botany Bay] (Pd). JAPAN: Honshu: Hashimoto 1624 (Bl-158236).

ERIOCAULON CIPOENSE Alv. Silv.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Phytologia 26: 20. 1973.

ERIOCAULON COLLETTII Hook. f.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Phytologia 24: 351. 1972.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 3. 1921.

ERIOCAULON COLLINUM Hook. f.

Additional synonymy: Eriocaulon luzulaefolium Thwaites, in herb. [not E. luzulaefolium Mart., 1832].

Additional bibliography: H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 357. 1899; Wangerin in Just, Bot. Jahresber. 50 (1): 232. 1930; Alston in Trimen, Handb. Fl. Ceylon 6: 304 & 306. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Abeywickrama, Ceylon Journ. Sci. Bot. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Venkatarreddi, Bull. Bot. Surv. India 12: 220. 1970; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 875 [thesis]. 1973; Moldenke, Phytologia 26: 180 (1973) and 28: 101 & 145. 1974.

Additional illustrations: Fyson, Journ. Indian Bot. 2: 139, fig. 3, & pl. 15. 1921.

Venkatarreddi (1970) found this plant "Common in harvested fields", flowering from December to February, and cites his nos. 68360, 93186, 93372, & 95999.

Pearson (1899) cites his nos. 58 (from 3500 feet altitude) and 59 (from 5600 feet) and reports the species as "very common" at those altitudes in Sri Lanka. More recent collectors have encountered it in swamps in high forests, along muddy streams in patana grasslands, in swampy depressions along narrow streams in wet patana, along roadsides, and in marshland beside pools in "rough ground among mountains", growing among marsh grass. Max-

well & Jayasuriya report it as "common" in marshy areas. It is described as a tufted erect herb, with small gray or grayish inflorescences (heads), the individual flowers white. Sumithraarachchi describes the inflorescence heads as "black". It has been found growing at altitudes of from 3500 to 7100 feet, flowering in May and June (in addition to the months previously reported by me in this series of notes).

Material has been misidentified and distributed in some herbaria as E. luzulaefolium Mart. On the other hand, the Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28279, 28281, & 28292, distributed as E. collinum, are actually E. fluviatile Trimen.

Alston (1931) suggests that E. collinum may be conspecific with E. leucomeles Steud. If this is true, the latter name would have priority.

Additional citations: SRI LANKA: Alwis s.n. [Hakgala, April 1921] (Pd, Pd); Collector undetermined s.n. [Hakgala, 3.06] (Pd); Cooray 68051719 (W—2718774), 68051719R (Pd); Craig 6 (Pd); W. Ferguson s.n. [Abbotsford, Dimbula] (Pd); Hepper 4427 (W—2720002), 4442 (Pd, W—2720014); Koyama 14641 (W—2762878); Maxwell & Jayasuriya 876 (Pd, W—2760938); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28271 (Ac, Gz, Kh, Ld, Pd, Z), 28272 (Ac, Gz, Kh, Ld, Pd), 28283 (Ld, Pd), 28287 (Ac, Gz, Kh, Ld, Pd), 28307 (Ac, Ca, Gz, Kh, Ld, Pd); A. M. Silva s.n. [Ambewela, 19/5/06] (Pd), s.n. [path to Fort Macdonald, 25/4/06] (Pd), s.n. [Maturata, 18/5/06] (Pd); Sumithraarachchi DBS.113 (Z); Thwaites C.P. 792, in part (Pd), 796, in part (Pd, Pd).

ERIOCAULON COLLINUM var. NANUM Moldenke, *Phytologia* 28: 101. 1974.

Bibliography: Moldenke, *Phytologia* 28: 101 & 445. 1974.

This variety is based on J. M. Silva s.n., collected along a riverbank on the Horton Plains, Nuwara Eliya District, Central Province, Sri Lanka, on March 20, 1911, and two specimens are deposited in the herbarium of the Botanic Garden at Peradeniya. The plant is a dwarf herb, the flowering peduncles 2--12 cm. long, and the leaves very thin-membranous and tenuous, 1--4 cm. long, 0.5--1.5 mm. wide, glabrous, plainly fenestrate at the base, and the tips often subfiliform and weak. The variety is known only from the Horton Plains area and has also been collected in anthesis in February and April.

Citations: SRI LANKA: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28284 (Ld, Pd, Z); A. M. Silva s.n. [N' Eliya lake, 9/4/06] (Pd); J. M. Silva s.n. [March 20, 1911] (Pd—type, Pd—iso-type); Thwaites C.P. 796, in part (Pd).

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Sharma, *Nucleus* 15: Append. 10. 1972; W. Stone, *Pl. South. N. J.*, pr. 2, 323--325, pl. 64, fig. 2. 1973; Moldenke, *Phytologia* 26: 457--458 (1973) and 28: 428. 1974.

Additional illustrations: W. Stone, *Pl. South. N. J.*, pr. 2,

pl. 64, fig. 2. 1973.

It is worth noting that the scapes are 8—10-angled on Nash 92 and 9- or 10-angled on Chickering s.n. [Hayward]. Sharma (1972) reports the chromosome count as 40.

Recent collectors have found the plant in anthesis as late as September in New Jersey.

Material has been misidentified and distributed in some herbaria as E. septangulare With. and as Lachnocaulon floridanum Small. On the other hand, the Herb. Chapman 555, Hollick s.n. [Aug. 15, '85], and Murrill 713, distributed as E. compressum, are actually E. decangulare L., O'Neill s.n. [Sept. 12, 1929] is E. decangulare var. latifolium Chapm., J. Davis s.n. [13-7-21], Hale s.n. [1840], A. A. Heller 181, W. Rhoades 323, Small & Heller 181, and Ulksi s.n. [Oct. 7, 1917] are E. decangulare f. parviceps Moldenke, and W. H. Brown 66 and Gleason, Smith, & Alexander 173 are E. pellucidum Michx. Martindale s.n. [Sep. 1877] is a mixture with E. decangulare L., while R. M. Harper 2146 is a mixture with E. lineare Small.

Additional citations: NEW JERSEY: Atlantic Co.: Killip 13295 (W-1435297); Van Sickle s.n. [Landisville, Aug. 10, 1890] (W-243226). Burlington Co.: Eames s.n. [VI-12-1894] (W-309077); Leonard & Leonard 6377 (W-2160300); Martindale s.n. [Sep. 1877] (W-784510); Moldenke & Moldenke 28597 (Ac, Gz, Kh, Ld). Cape May Co.: E. C. Leonard 2344 (W-2160186). County undetermined: Canby s.n. [Wet Pine Barrens, June 1862] (W-45270). NORTH CAROLINA: Columbus Co.: Godfrey & White 7104 (W-1811544). New Hanover Co.: Buell & Godfrey 3550 (W-1767089); Godfrey & White 7083 (W-1811530). County undetermined: McCarthy s.n. [April 1888] (W-45272, W-45277). SOUTH CAROLINA: Darlington Co.: J. B. Norton s.n. [March 18, 1921] (W-1115519), s.n. [Ap. 26, 1921] (W-1115520). Lexington Co.: Weatherby 6123 (W-1567545). GEORGIA: Bryan Co.: R. M. Harper 2170 (W-511188). Charlton Co.: F. Harper s.n. [Okefinokee Swamp, Jan. 11, 1917] (W-911035). Chatham Co.: Hotchkiss & Ehvall 3874 (W-2587246). Early Co.: Thorne 3294 (W-2005884). Montgomery Co.: R. M. Harper 2146, in part (W-511164). Sumter Co.: R. M. Harper 2219 (W-511236). Ware Co.: Tyron & Mc Vaugh 1481 (W-1811284). FLORIDA: Brevard Co.: Edw. Palmer 579 (W-45275). Calhoun Co.: Meigs s.n. [Mch. 1886] (W-937178). Clay Co.: Canby s.n. [Hibernia, March 1869] (W-45274). Duval Co.: Curtiss 3017 (W-937171), 4585 [March 13] (W-224480), 4584 [April 19] (W-224480); Fredholm 500 (W-214862); J. D. Smith 106 (W-937175), 378 (W-937174). Highlands Co.: Brass 14455 (W-2065019), 14611 (W-2065083), 14868 (W-2065214), 14880 (W-2065222). Lake Co.: Nash 92 (W-228001). Lee Co.: Francis 63 (W-1036541); J. P. Standley 15 (W-569473); P. C. Standley 12552 (W-896022), 12585 (W-896052), 12821 (W-896278), 14880 (W-897347). Levy Co.: G.

S. Miller 380 (W--1287747); O'Neill 732 (W--1241624). Okeechobee Co.: Brass 14582 (W--2065064). Osceola Co.: J. D. Smith s.n. [19 Mch. 1886] (W--937177). Palm Beach Co.: Small, DeWinkeler, & Rane 9815 (W--1738522). Polk Co.: Topping 2611 (W--1729088). Putnam Co.: Godfrey & Reinert 61111 (W--2385135). Saint Johns Co.: E. Doubleday s.n. [St. John's] (Pd); J. D. Smith 76 (W--937176), 422 (W--937173). Seminole Co.: Blanton 6512 (W--1485555); Garber s.n. [March 1876] (W--264068). Volusia Co.: H. C. Beardslee s.n. [March 1925] (W--1872347); A. S. Marsh 157 (W--1285355). Walton Co.: R. Kral 19844 (W--2470396). County undetermined: Chickering s.n. [Hayward] (W--155811); J. H. Simpson 548 [border of Everglades] (W--45276); Sperry 549 [Lake Lammonia] (W--1467112). ALABAMA: Mobile Co.: Mohr s.n. [March 1892] (W--784511). LOUISIANA: Calcasieu Par.: E. J. Palmer 7718 (W--1531692). Saint Tammany Par.: Canby, Sargent, & Trelease 256 (W--369743); R. Kral 16508 (W--2470426). TEXAS: Hardin Co.: E. J. Palmer 9563 (W--1531942).

ERIOCAULON COMPRESSUM var. HARPERI Moldenke

Additional bibliography: Moldenke, *Phytologia* 26: 181 & 457 (1973) and 28: 428. 1974.

It is of interest to note that the scapes (peduncles) on Tracy s.n. [5/9/1898], cited below, are 8--10-angled.

Material of this variety has been misidentified and distributed in some herbaria under the names E. gnaphalodes Michx. and E. lineare Small.

Additional citations: FLORIDA: Bay Co.: R. Kral 19800 (W--2470370). Escambia Co.: R. Kral 19876 (W--2470391), 19880 (W--2470398). Franklin Co.: Biltmore Herb. 2296 (W--955021), 2296a (W--335121). Highlands Co.: Brass 14659 (W--2065106). Leon Co.: H. Kurz s.n. [May 16, 1926] (W--1287794). Osceola Co.: Mearns 33 (W--391120). Wakulla Co.: H. N. Moldenke 1123 (W--1581782). Walton Co.: R. Kral 19808 (W--2470400). Washington Co.: Small & Wherry 11695 (W--1738872). County undetermined: Herb. Chapman s.n. [Florida] (W--45271). ALABAMA: Baldwin Co.: Ilitis, Cross-white, & Kawano 21540 (Ca--1357905). Mobile Co.: Curtiss s.n. [1875] (W--45273); R. Kral 26526 (W--2470403). MISSISSIPPI: George Co.: R. Kral 19854 (W--2470397). Harrison Co.: Tracy 5032 (W--341109), s.n. [5/9/1898] (W--309079). LOUISIANA: Saint Tammany Par.: Langlois s.n. [1.V.1893] (W--1655533).

ERIOCAULON COMPTONII Rendle

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1923; Moldenke, known Geogr. Distrib. Verbenac., [ed. 2], 151 & 204. 1949; Moldenke, *Phytologia* 24: 351--352. 1972.

ERIOCAULON CONCRETUM F. Muell.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 204. 1949; Moldenke, Phytologia 24: 352. 1972.

ERIOCAULON CONICUM (Fyson) C. E. C. Fischer

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 24: 352. 1972.

ERIOCAULON CONIFERUM Herzog

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Phytologia 24: 352. 1972.

ERIOCAULON CRASSISCAPUM Bong.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76, 103, & 204. 1949; Angely, Fl. Anal. & Fito-geogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Moldenke, Phytologia 26: 458 & 460. 1973.

ERIOCAULON CRISTATUM Mart.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 124, 126, 132, 134, 135, 139, & 204. 1949; Moldenke, Phytologia 24: 349 & 352 (1972) and 26: 19. 1973.

Alston (1931) asserts that Trimen's record of this species from Sri Lanka, based, apparently, on his C.P. 789 collection (for which he proposed an innominate varietal status as "var. bracteis floralibus denticulatis et longiuscule cuspidato-acuminatis"), is a misidentification of E. ceylanicum Körn. C.P. 789 is cited by me as E. longiuspe Hook. f., the same disposition of it as is given also by Hooker.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia, 4-5000 ped.] (Pd); Native collector s.n. [Khasi hills] (Pd).

ERIOCAULON CRISTATUM var. MACKII Hook. f.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 24: 353. 1972.

ERIOCAULON CUBENSE Ruhl.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 45 & 204. 1949; Moldenke, Phytologia 24: 353. 1972.

ERIOCAULON CUSPIDATUM Dalz.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Thaker, Sabnis, & Bedi, Bull. Bot. Surv. India 12: 125. 1970; Moldenke, Phytologia 26: 21. 1973.

Thaker and his associates (1970) record this species from Gujarat, India.

Additional citations: INDIA: Kerala: Stocks, Law, &c. s.n. [Malabar, Concan] (Pd).

ERIOCAULON DALZELLII Körn.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 126, 130, & 204. 1949; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 141. 1959; Moldenke, Phytologia 24: 353 (1972) and 28: 192, 442, & 444. 1974.

Gould & Cooray encountered this plant in marshy soil along a stream, at 2300 meters altitude, flowering in May. Durand & Schinz (1894) report it from Sierra Leone.

The W. Ferguson s.n. [Labugama, 1832], distributed as E. dalzellii, is actually E. fluviatile Trimen.

Additional citations: INDIA: Kerala: Stocks, Law, &c. s.n. [Malabar, Concan] (Pd). SRI LANKA: Gould & Cooray 13787 (Ca--1376098).

ERIOCAULON DAMAZIANUM Beauverd

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Phytologia 24: 353. 1972.

ERIOCAULON DECANGULARE L.

Additional bibliography: Wikstr., K. Svensk. Vet. Acad. Handl. Stockh., ser. 2, 1: 74. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. [7] (repr.). 1821; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 4--9, 11, 18, 22, & 204. 1949; Bullock, Taxon 8: 171. 1959; Hocking, Excerpt. Bot. A. 19: 43. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; C. A. Br., Wildfls. La. 11, 238, 240, & 243. 1972; Rouleau, Taxon Index Vols. 1-20 part 1: 139. 1972; Robichaud & Buell, Veg. N. J. 319 & 327. 1973; W. Stone, Pl. South. N. J., pr. 2, 323 & 325, pl. 28, fig. 2. 1973; Moldenke, Phytologia 26: 458 (1973) and 28: 427--430 & 456. 1974.

Additional illustrations: C. A. Br., Wildfls. La. 11 (in color). 1972; W. Stone, Pl. South. N. J., pr. 2, pl. 29, fig. 2. 1973.

Recent collectors have encountered this plant in pine-palmetto swamps.

The label on Lundell 11902 in the United States National Herbarium is inscribed "Perennial herb, corolla yellow, anthers or-

ange", so this is doubtless a case of transposed labels. A binary head is seen on the United States National Herbarium specimen of J. D. Smith 492. Common names for the species in Florida include "bachelor's button" and, among the Seminole Amerinds, "talakcy: lf". Brown (1972) records "hard-heads" for it in Louisiana.

It is worthy of note that the scapes (peduncles) are 10-angled on Shreve & Jones 1300, 11-angled on A. S. Hitchcock 375, 10- or 11-angled on Hollick s.n. [Aug. 15, '85], 8--10-angled on Kearney 1558, 9--13-angled on Hyams s.n. [Bengaw, Sept. 1879], and 12--14-angled on Tracy 6417, all deposited in the United States National Herbarium at Washington.

Fernald & Long 14924 and Godfrey 5760 exhibit characters approaching those of f. parviceps Moldenke, while Biltmore Herb. 3867c, Curtiss 3016, Nash 847, Small & Heller 180, and P. C. Standley 18888 exhibit leaves which approach those of var. latifolium Chapm.

The following collections, cited herein under f. parviceps, were collected early in the season (mostly in May, June, or July) and are very immature. They may well represent very immature specimens of typical E. decangulare L.: Biltmore Herb. 3867b, Coville 202, Hotchkiss & Ekvall 3755, R. Kral 17208 & 17223, McCarthy s.n. [Julio 1885], E. J. Palmer 7981, Small & Heller 180, Thaxter s.n. [Cullhowee, June 15--July 15, 1887], and Tracy 7587. E. C. Leonard 2344, distributed as E. decangulare, is actually E. compressum Lam.; Martindale s.n. [Atsion, Sep. 1877] is a mixture with E. compressum; Ahles 54809, Holm s.n. [7.1888], and Thomas, Dorris, & Drane 13921 are E. decangulare var. minor Moldenke, while W. M. Canby s.n. [Pine barrens] is E. pellucidum Michx.

Additional citations: NEW JERSEY: Atlantic Co.: Standley & Kilip 7567 (W--1115386). Burlington Co.: M. A. Chase 3552 (W--594231); Martindale s.n. [Atsion, Sep. 1877] (W--784510). Monmouth Co.: D. C. Eaton s.n. [1860] (W--2588805). Ocean Co.: Chickering s.n. [June 28, 1877] (W--937164); Drushel 8358 (W--1600939); Eggleston 4894 (W--586070); Hollick s.n. [Aug. 15, '85] (W--309076); Lyon s.n. [Aug. 15, 1902] (W--1101385); Mackenzie 3694 (W--648776). County undetermined: N. L. Britton s.n. [Pine Barrens, Aug. '79] (W--309073); W. M. Canby s.n. [Pine barrens] (W--45301); Eaton 15654 (Pd). MARYLAND: Wicomico: W. M. Canby 192 (W--937167); Shreve & Jones 1300 (W--608564). DISTRICT OF COLUMBIA: Holm s.n. [8.1900] (B1--253866). VIRGINIA: Norfolk Co.: Kearney 1558 (W--356248). Prince George Co.: Fernald, Long, & Smart 6790 (W--1682875). Sussex Co.: Fernald & Long 14924 (W--2003551). NORTH CAROLINA: Brunswick Co.: Drushel 10075 (W--1688975). Carteret Co.: Godfrey 5792 (W--1768165); McCarthy 5 (W--45308). Chowan Co.: Godfrey 5345 (W--1768032). Columbus Co.: Godfrey 6341 (W--1768438). Craven Co.: W. H. Brown 49 (W--512889);

Godfrey 4432 (W--1767483). Cumberland Co.: Godfrey 4550 (W--1767577). Onslow Co.: Godfrey 5760 (W--1768114). Pender Co.: Godfrey 4740 (W--1767704); Hyams s.n. [Bengaw, Sept. 1879] (W--152099). Rowan Co.: Small & Heller 180 (W--937162). Roanoke Island: Hotchkiss & Uhler 7225 (W--2422098). County undetermined: Small & Heller s.n. [North Carolina] (W--45264). SOUTH CAROLINA: Berkeley Co.: Godfrey & Tryon 603 (W--1837454). Darlington Co.: Norton s.n. [Cohen 69] (W--1070520). Georgetown Co.: Godfrey & Tryon 343 (W--1837243). Greenville Co.: J. D. Smith 16 (W--937163). Hampton Co.: Wilbur & Webster 2833 (W--2132026). Williamsburg Co.: Godfrey & Tryon 509 (W--1837383). GEORGIA: Ben Hill Co.: R. Kral 28773 (W--2673948). Brooks Co.: R. Kral 28685 (W--2673944). Calhoun Co.: R. Kral 28624 (W--2673946). Camden Co.: Drushel 10133 (W--1688980). Dodge Co.: R. Kral 28745 (W--2673945). Early Co.: R. Kral 27090 (W--2673947). Jeff Davis Co.: Shacklette 6919 (E1--201214). Laurens Co.: R. Kral 28723 (W--2673942). Screven Co.: R. Kral 24030 (W--2470322). Sapelo Island: Duncan 20365 (W--2262623). FLORIDA: Duval Co.: Curtiss 3016 (W--45269, W--937159), 5060 [June 20] (W--224479), 5060 [Aug. 6] (W--224479), 5690 [June 24] (W--280617), 5690 [Aug. 21] (W--280617). Franklin Co.: Biltmore Herb. 3867c (W--335192). Hendry Co.: Sturtevant 148 (W--2524700). Hernando Co.: Howard 12953 (W--2327934). Highlands Co.: Brass 15282 (W--2065465). Lake Co.: Nash 847 (W--228003, W--937165), 1722 (W--228082, W--937166). Lee Co.: A. S. Hitchcock 375 (W--387408); P. C. Standley 12866 (W--896323), 18888 (W--1028667), 18891 (W--1028670). Levy Co.: Kral & Kral 6920 (W--2308420). Manatee Co.: Perdue 1757 (W--2233087). Orange Co.: Murrill 713 (W--1928533). Washington Co.: E. S. Ford 3686 (W--2230909). Saint Vincent Island: McAtee 1828 (W--586169). County undetermined: Herb. Chapman 555 (W--937170); J. H. Simpson 396 [Trahuc] (W--45266). ALABAMA: Baldwin Co.: Mohr s.n. [Oct. 7, 1894] (W--784513); Tracy 8043 (W--513697). Butler Co.: J. D. Smith 491 (W--937158), 492 (W--937157). Escambia Co.: R. Kral 32488 (W--2673953). Mobile Co.: Bush 71 (W--318393); Mohr s.n. [Aug. 1870] (W--784516). MISSISSIPPI: Covington Co.: Webster & Wilbur 3373 (W--2068092). Hancock Co.: Drushel 10094 (W--1688978). Harrison Co.: Demaree 30610 (W--2176872); Tracy 6417 (W--383776), s.n. [7/2/1895] (W--309079). Jackson Co.: Tracy 6417 (W--354205). Pearl River Co.: R. Kral 17331 (W--2470429). LOUISIANA: Calcasieu Par.: Allison 267 (W--514075). Saint Tammany Par.: Arsène 11030 (W--1031601), 11663 (W--1031602), 11786 (W--1033018), 12259 (W--1033053); Langlois s.n. [9.IX.1892] (W--1465968). TEXAS: Hardin Co.: Lundell & Lundell 11902 (W--2330383); Tharp s.n. [2-21-42] (W--1873641).

ERIOCAULON DECANGULARE var. LATIFOLIUM Chapm.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9, 11, & 204. 1949; Moldenke, Phytologia 24: 354 (1972) and 28: 428. 1974.

Material of this variety has been misidentified and distributed in some herbaria as E. compressum Lam. The Biltmore Herb. 3867c, Nash 847, Small & Heller 180, and P. C. Standley 18888, cited herein as typical E. decangulare L., have leaves rather wide for that taxon and may very possibly represent var. latifolium instead. They are from Franklin County, Florida, Lake County, Florida, Rowan County, North Carolina, and Lee County, Florida, respectively.

Additional citations: FLORIDA: Marion Co.: O'Neill s.n. [Sept. 12, 1929] (W-1488441). County undetermined: Herb. Chapman 553 [Florida] (W-937161), s.n. [Florida] (W-955018—isotype). ALABAMA: Baldwin Co.: Mohr & Sargent s.n. [Oct. 7, 1894] (W-784512). MISSISSIPPI: Harrison Co.: J. D. Smith 650 (W-937160).

ERIOCAULON DECANGULARE var. MINOR Moldenke

Additional bibliography: Moldenke, Phytologia 26: 22 (1973) and 28: 427 & 429. 1974.

Recent collectors have found this plant growing in swamps and on boggy pond shores, flowering (in addition to the months previously reported) in June.

Additional citations: DISTRICT OF COLUMBIA: Holm s.n. [7.1888] (Bl--253279). NORTH CAROLINA: Lincoln Co.: Ahles 54809 (Bl--180702). LOUISIANA: Jackson Par.: Thomas, Dorris, & Drane 13921 (Bl--244325).

ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, Phytologia 26: 458 (1973) and 28: 427—430. 1974.

Recent collectors have found this plant growing in tufts on sandy peat of bogs in longleaf pine savannas, in sandy clay peat moist from borrow pit bogs, in sandy peat of pine flatwoods bogs, in wet sand and gravel openings in swamps, on Sphagnum hillocks in open white gravelly bogs, in grass-sedge bogs or savannas, on gravel in seepage bogs, in moist pinebarrens, boggy woods, coastal plain swamps, moist meadows, pinelands and wet open pinelands, white sandy swamps, open, sandy, acid, and mountain bogs, and savannas, at altitudes from near sealevel to 2500 feet. The flowering-heads are uniformly described as white or gray-white. The scapes are to 4 dm. tall on Cory 56611, 7-angled, with the sheath surpassing the leaves. Thaxter s.n. [Cullhowee, June 15--July 15, 1887] has its scapes 8--10-angled, Ward s.n. [Holmead Swamp, Oct. 3, 1880] has them 7--10-angled, Hyams s.n. (Burgaw, Aug. 1878] has them 10-angled, McCarthy s.n. [julio 1885] 7- or 8-angled, and R. M. Harper 444 only 9-angled. On J. Reverchon 4359a the scapes are 6-angled and the plant is obviously in very young flower-bud condition (collected on May 9).

It should be noted here that the leaves are rather long and broad in J. Reverchon 2766 (collected on July 10), Tharp 4434b, and Hotchkiss & Ekvall 3755. One sheet of Hale s.n. [1840] has leaves of typical f. parviceps length and breadth, while the other sheet has them extra long and broad. One plant on the Ward s.n. [Holmead Swamp, Oct. 3, 1880] exhibits leaves typical for f. parviceps, while the other has them extra long and broad. McCarthy s.n. [julio 1885] consists of 3 typical f. parviceps plants as to leaf-size and -shape, and a fourth plant with much longer and wider leaves (this latter plant may be a juvenile specimen of typical E. decangulare L.). The Collector undesignated s.n. [1832], cited below, has leaves of typical f. parviceps length, but rather broader than is typical for the form.

Harper says of his no. 3996: "May be E. decangulare, but rather small, pretty far inland, and blooming rather late [Aug. 15] for that species". He found it growing among rocks below the highwater mark along the Little River, Cherokee County, Alabama, and adds the comment that "E. lineare was found in the same county in 1906 (see Bull. Torrey Club 33: 527) but that blooms still earlier."

Practically all the New Jersey specimens cited below have erect elongate leaves, all the Maryland specimens have short tenuous leaves, almost all the District of Columbia collections have rather longish narrow leaves [except one plant of the Ward s.n. collection]. Most of the North Carolina specimens exhibit narrow rather short leaves [except as otherwise noted below] — the collections made in July and August appear to have mature heads and are probably correctly identified as f. parviceps, but those collected in June or even early July, if also exhibiting larger leaves, may very well prove to be immature examples of typical E. decangulare. Most of the Georgia collections have rather short narrow leaves as is typical of f. parviceps (e.g., Cronquist 5425, Earle 3123, R. M. Harper 4444, W. Rhoades 323). Maxon 6469 actually has leaves so tiny that they greatly resemble those of E. pellucidum Michx.! Wurdack & Wurdack 2542 is a voucher for anatomical material and the collectors note that the plant was "locally abundant". All the South Carolina specimens cited below show narrow somewhat elongate leaves.

The following collections, although cited below because of their small heads, are very immature and in view of the early time of collection may actually represent not-yet-fully-developed plants of typical E. decangulare L. whose flower-heads have not yet fully expanded: Biltmore Herb. 2867a [July] & 3867b [July], Coville 202 [June], R. Kral 17208 [May 29] & 17223 [May 29], E. J. Palmer 7981 [June 12], and Tracy 7587. The following have rather large leaves and may actually represent immature specimens of var. latifolium Chapm.: Hotchkiss & Ekvall 3755 [June], Small & Heller 180 [June 25-26, 1891], and Thaxter s.n. [Chillhowee, June 15--July 15, 1889].

On the other hand, the following collections, also cited below, are likewise only in flower-bud condition but seem rather definitely to be f. parviceps when the sum total of characters is considered: Godfrey 4483 [June], Pollard 484 [July], and P. C. Standley 11756 [June] -- House 2602 has slightly wider leaves but otherwise meets all the important characteristics of f. parviceps.

In summation: of the specimens cited below the following seem very definitely to represent f. parviceps and may be taken as truly representative: (1) collected in June: Cronquist 5425, Earle 3123, Godfrey 4483; (2) collected in July: Anect 90, Chickering s.n. [Manchester, July 19, 1873], Fogg 4602, Godfrey 4868, Godfrey & Tryon 927, House 2602, R. Kral 20651 & 20970, McAttee 989, McCarthy s.n. [Julio 1885] in part, Pollard 484, and Tharp 2380, 44345, 44346, & 44348a; (3) collected in August: N. L. Britton s.n. [Manchester, Aug. 28, 1879], M. A. Chase 6854, Fogg 4655, Godfrey 5821 & 6166, R. M. Harper 444 & 3996, Killip 6470, Leggett s.n. [Quaker Bridge, Aug. 8th 1864], E. C. Leonard 706, W. Rhoades 323, Steele s.n. [Tecoma Park, Aug. 12, 1896], and Van Eseltine 190; (4) collected in September: E. J. Alexander s.n. [Forked River, Sept. 18, 1932], Coville s.n. [Holmead's Swamp, Sept. 29, 1889], Maxon 6469, Olds s.n. [Old Powder Mill Swamp, Sept. 1898], and Standley & Bollman 10258; and (5) collected in October: Dewey 158 and Ward s.n. [Holmead Swamp, Oct. 3, 1880] in part.

As some indication of how different from the typical E. decangulare L. is the aspect of this plant when fully matured, one should note the large number of the collections cited below which were originally identified by the collectors in the field as E. compressum Lam., E. gnaphalodes Michx., E. lineare Small, E. septangulare With., and E. texense Körn. Material of this form has also been misidentified and distributed in some herbaria under the curious designations "Eriocaulon decangularis L." and "Lachnocaulon anceps (Walt.) Moray".

The following collections were previously misidentified and cited by me as E. decangulare before more intensive study revealed the presence of subspecific taxa: E. J. Alexander s.n. [Forked River, Sept. 18, 1932], Biltmore Herb. 3867a & 3867d, Braun s.n. [July 26, 1938], N. L. Britton s.n. [Manchester, Aug. 28, 1879], Collector undetermined s.n. [1832], Cronquist 5425, Earle 3123, Godfrey 5821 & 6166, Godfrey & Tryon 927, R. M. Harper 444 & 3996, A. A. Heller 181 [August 21, 1890], R. Kral 17223, 20651, & 20970, Leggett s.n. [Quaker Bridge, Aug. 8th, 1864], Reverchon 2766, W. Rhoades 323, Small & Heller 180 [June 25--26, 1891], Tharp 44345, 44346, 44348a, & s.n. [Sealy, 6/28/42], and E. H. Walker 4160.

Additional citations: NEW JERSEY: Burlington Co.: Fogg 4602

(W--1630698), 4655 (W--1630699); Leggett s.n. [Quaker Bridge, Aug. 8th 1864] (N); Wurdack & Wurdack 2542 (W--2537034). OCEAN CO.: E. J. Alexander s.n. [Forked River, Sept. 18, 1932] (N); N. L. Britton s.n. [Manchester, Aug. 28, 1879] (N); Chickering s.n. [Manchester, July 19, 1873] (W--2588395). MARYLAND: Harford Co.: Ulksi s.n. [Oct. 7, 1917] (W--1439973). Prince Georges Co.: M. A. Chase 6854 (W--642607); Killip 6470 (W--1088649); E. C. Leonard 706 (W--2153188); McAtee 989 (W--642738); Olds s.n. [Old Powder Mill Swamp, Sept. 1898] (W--338855); P. C. Standley 11756 (W--895338); E. H. Walker 4160 (N). DISTRICT OF COLUMBIA: Coville s. n. [Holmead's Swamp, Sept. 29, 1889] (W--45309); Dewey 158 (W--283491); Maxon 6469 (W--1184060); Pollard 484 (W--293635, W--307440); Steele s.n. [Tacoma Park, Aug. 12, 1896] (W--363620); Van Eseltine 190 (W--642234); Vasey s.n. [Holmead Swamp, 1881] (W--9786); Ward s.n. [Holmead Swamp, Oct. 3, 1880] (W--152100), s.n. [1884] (W--242442). NORTH CAROLINA: Brunswick Co.: Godfrey 4868 (W--1767804). Buncombe Co.: Biltmore Herb. 3867a (N, W--331152), 3867d (N, W--335490); Standley & Bollman 10258 (W--689079). Catawba Co.: Small & Heller 180 [June 25--26, 1891] (N, W--45265). Columbus Co.: Braun s.n. [July 26, 1938] (W--2666390). Dare Co.: Hotchkiss & Ekvall 3755 (W--2422097). Jackson Co.: Thaxter s.n. [Cullhowee, June 15--July 15, 1887] (W--415881). New Hanover Co.: Biltmore Herb. 3867b (W--331151); Coville 202 (W--45307). Onslow Co.: Godfrey 4483 (W--1767530), 5821 (N, W--1768188). Pender Co.: Hyams s.n. [Burgaw, Aug. 1878] (W--152097). Rowan Co.: A. A. Heller 181 [August 21, 1890] (C); Small & Heller 181 [Aug. 14, 1891] (W--937172). Sampson Co.: Godfrey 6166 (W--1768297). County undetermined: McCarthy s.n. [Julio 1885] (W--152098, W--243906). SOUTH CAROLINA: Anderson Co.: J. Davis s.n. [13-7-21] (W--1089021). Clarendon Co.: Godfrey & Tryon 927 (N, W--1837695). Lancaster Co.: House 2602 (W--514154). GEORGIA: Columbia Co.: Collector undetermined s.n. [1832] (C). Douglas Co.: Cronquist 5425 (N, W--1928744). Lee Co.: Earle 3123 (N). Sumter Co.: R. M. Harper 444 (N, W--384446). Wilcox Co.: W. Rhoades 323 (N). FLORIDA: Manatee Co.: Tracy 7587 (W--442233). ALABAMA: Cherokee Co.: R. M. Harper 3996 (N, W--2175560). LOUISIANA: Allen Par.: R. Kral 20970 (N, W--2470409). Beauregard Par.: R. Kral 17208 (W--2470427). Nat-chitoches Par.: E. J. Palmer 7981 (W--1531711). Rapides Par.: Hale s.n. [1840] (W--784514, W--784515). Saint Tammany Par.: Anect 90 (W--1087047). Vernon Par.: R. Kral 17223 (N, W--2470396), 20651 (N, W--2470395). TEXAS: Austin Co.: Tharp 44346 (N), 44348a (N), s.n. [Sealy, 6/28/42] (N, W--1873642), s.n. [Bog near Sealy, 6/28/42] (B1--50060). Hardin Co.: Tharp, Gimbrede, & Yang 51-1449 (B1--91419); Tharp & Tyson s.n. [6/27/52] (B1--91875). Henderson Co.: Tharp 2880 (W--1203408). Jasper

Co.: Cory 56611 (W--2007913). Robertson Co.: F. A. Barkley 13540 (W--1870419). Smith Co.: J. Reverchon 2766 (N, W--440232, W--500957), 4359a (W--501327). Tyler Co.: Tharp 44345 (N). Waller Co.: E. Hall 675 (W--45267). NICARAGUA: Cabo Gracias a Dios: Bunting & Licht 438 (N).

ERIOCAULON DECEMFLOSUM Maxim.

Additional & emended bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130, 133, 134, & 204. 1949; Satake, Journ. Jap. Bot. 46: 372--373 [20--21]. 1971; Moldenke, Phytologia 24: 354. 1972.

ERIOCAULON DECEMFLOSUM f. ABERANS Satake

Additional & emended bibliography: Satake, Journ. Jap. Bot. 46: 373 [21]. 1971; Moldenke, Phytologia 24: 354. 1972.

Emended illustrations: Satake, Journ. Jap. Bot. 46: 373 [21]. 1971.

ERIOCAULON DECIPIENS N. E. Br.

Additional synonymy: Eriocaulon sonderianum Rendle ex N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 245, in syn. 1901 [not E. sonderianum Körn., 1856].

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 235 & 245. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 119, 120, & 204. 1949; Moldenke, Phytologia 24: 354--355 (1972) and 28: 457. 1974.

Brown (1901) cites Whyte 115 from Malawi and comments: "This plant is so exceedingly like E. sonderianum, Koernicke, in external appearance as to have been mistaken for it, but it distinctly differs in the following particulars: -- The flowering-bracts are much longer, broader, without the fuscous spot on each side of the less pronounced keel, and are less rigid and more membranous; the sepals of the male flowers are larger, much more membranous, not keeled, and are fuscous quite to the apex, whilst in E. sonderianum the apical part of the sepals of the male flowers is white with a whitish mid-line running half-way down the keel. Other differences may, perhaps, be found in the female flowers when known. From E. Dregei, Hochst., it differs in its very acute leaves, and much shorter cilia on the sepals, &c."

ERIOCAULON DENSUM Mart.

Additional bibliography: Moldenke, Phytologia 24: 355 (1972) and 25: 229 & 239. 1973.

ERIOCAULON DEPAUPERATUM Merr.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 141 & 204. 1949; Moldenke, Phytologia 24: 355. 1972.

[to be continued]

A NEW SPECIES OF OREOWEISIA FROM MEXICO

(DICRANACEAE, MUSCI)

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The genus Oreoweisia is of world wide distribution with the greatest concentration of species in Latin America. The Mexican representatives of the genus, for unknown reasons, have been very late coming to the attention of bryologists. The South American O. ligularis Mitt. was listed by Crum (1951) from Jalisco and by Delgadillo M. (1971) as O. bogotensis (Hampe) Mitt. from the volcanoes Nevada de Toluca and Popocatepetl (State of Mexico) and Ixtaccihuatl (State of Puebla). A second Mexican species, O. mexicana H. Robins., was described as new in 1965 from the State of Guerrero. More recent collections of Oreoweisia have now appeared that seem to be a third and previously undescribed species from Mexico.

The new species is the first from Mexico having smooth rather than papillose or mamilliose leaf cells. The appearance is rather close to O. mexicana but that species has the additional differences of broader capsules with urns half as wide as long and larger spores 25-30 μ in diameter. A Bolivian species, O. tunariensis Herz., has described features most similar to the new species from Mexico, but the former has more linear leaves, smaller spores (15-20 μ), and the median cells of the leaf are distinctly larger than those at the margin.

Oreoweisia delgadilloi H. Robinson & F. D. Bowers, sp. nov.

Plantae parviccae dense caespitosae ca. 2 cm altae virides inferne albo- vel rufo-tomentosae; folia sat laxe inserta sicca contorta humida erecto-patentia anguste oblonga plerumque ca. 3 mm longa et 0.6-0.7 mm lata margine plana vel leniter recurvata inferne integra superne sensim distincte serrulata apice breviter acuta supra et subtus laevia, cellulis mediis plerumque subquadratis vel brevioribus 10-17 μ latis 7-12 μ longis basilaribus sensim leniter longioribus prope costam usque ad 50 μ longis, parietibus basilaribus interioribus leniter tenuioribus, costis

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² Contribution from the Botanical Laboratory, The University of Tennessee, N.S. no. 420.

subpercurrentibus inferne ca. 100 μ latis. Folia perichaetialia similaria plerumque 2-3 mm longa inferne laxe convoluta, cellulis basilaribus valde laxioribus. Calyptrae cucullatae ca. 2.5 mm longae laeves. Setae 5-6 mm longae flavae laeves; opercula breviter rostrata ca. 0.5 mm longa; thecae anguste ovali-oblongae plerumque 1.2-1.3 mm longae ca. 0.4 mm latae flavae vel luteae sub orificio parum constrictae anguste rufescentes; dentes rubescentes ca. 250 μ longi laeves superne ad medium irregulariter fenestrati; sporae 20-25 μ diam. ovaes perminute papillosae.

Type: MEXICO: Durango: Hanging on side of cliff, partial shade, meso., ridge. Oak-pine forest with Madroño along Hwy. 40 about 9 miles west of La Ciudad. 8,650 ft., 30 Dec. 1973. Bowers, Delgadillo M., & Somers 5075 (US, holotype; TENN, isotype). Paratypes: MEXICO: Durango: Oak-pine forest with large exposed boulders (granite?) along Hwy. 40 about 4 miles west of La Ciudad. 8900 ft., 30 Dec. 1973. Bowers, Delgadillo M., & Somers 5264-h; On moist, rather sunny rocks. In pine, oak, and juniper forest on flat top of ridge along Hwy 40 about 9 miles west of La Ciudad. Elev. ca. 8500 ft., 26 Dec. 1971. Norris et al 20792 (TENN & Herb. NORRIS); Chihuahua: On soil, partial shade, meso., slope. Oak-pine forest and stream with cliff (limestone) and rocks. 37 miles north of Creel (16 min. north of San Juanita) on road from Creel to La Junta (Hwy. 16). 8000 ft., 4 Jan. 1974. Bowers, Delgadillo M., & Somers 5395 (US, TENN).

The new species is named after Dr. Claudio Delgadillo M., bryologist on the staff of the Instituto de Biología, U.N.A.M. Ciudad Universitaria in Mexico.

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NOTES ON THE MOSSES OF JUAN FERNANDEZ AND SOUTHERN

SOUTH AMERICA

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A recent study of the mosses of the Juan Fernandez Islands off the coast of Chile has resulted in the discovery of three new species and has shown the need for some nomenclatural changes. The necessary additions and changes are presented here along with some notes on related species. Appended are notes on the distinctive Duseniella of Chile and Bucklandia of Tierra del Fuego. The sequence of the genera is according to the recent listing of families (Robinson, 1971).

Fissidens

Fissidens ornaticostatus H. Robinson, new species (Figs. 1-2) *Plantae pusillae*. Caules ca. 1 mm longi. Folia disticha 1.2 mm longa ca. 0.25 mm lata oblongo-elliptica acuta non acuminata margine minute serrulata prope basim minute dentata, laminis vaginantibus ca. 0.6 mm longis inaequalibus apice conjunctionibus interdum brevissimis, lamina dorsali ad basim sensim decurrente; nervo 25-30 μ lato ad cellulas 5-6 sub apice attingente, cellulis centralibus nervi (Fig. 1) biserialibus prominentibus 12-25 μ latis 30-70 μ longis subbasalibus 75-130 μ longis, cellulis externis utrinque transparentibus anguste fusiformibus 4-5 μ latis 20-40 μ longis; cellulis laminarum irregulariter multi-angularibus 8-10 μ diam. marginalibus interdum 6 μ diam., eis juxta nervum 12 μ diam., juxta nervum basim versus 18-40 μ longis 12 μ latis; cellulis submarginalibus nonnullis laminarum vaginantium plerumque elongatis ad 35 μ longis. Caetera ignota.

Type: JUAN FERNANDEZ: Mas a Tierra: V. Colonial, Q. Seca, 455 m, Skottsberg 26 in part (Holotype, S; isotype slide, US).

The new species is most closely related to Fissidens leptochaete Dus. which occurred in the same collection, but the former differs by the very prominent inner cells of the costa, the nonacuminate leaf tip and the essentially non-papillose leaf cells. Walls over the cell lumens are often a little thickened in the centers.

Rhacomitrium

A number of species from southern South America are notable

for the relatively stout costa of the leaves. The two most frequently cited species are Racomitrium nigritum Jaeg. and R. subnigritum (C.Müll.) Par. This distinctive group of species reaches its extreme form in Racomitrium bartramii (Roiv.) H. Robinson, new comb., basionym: Bucklandia bartramii Roiv., Arch. Soc. Zool. Bot. Fenn. Vanama 9(2): 91. 1955, of Tierra del Fuego. This last species has the costa totally filling the leaf apex and spores up to 28μ in diameter. The characters distinguish the species well, but they do not seem to justify separate generic status. The reduction of the monotypic genus avoids the need to provide a new name for Bucklandia Roiv. which is a later homonym.

Dicranoloma

Dicranoloma kunkelii H. Robinson, new species (Fig. 3)
 Planta dioica robustiuscula laxe caespitosa ad 5 cm alta. Caules erecti, sectione transversa fasciculum centralem pusillum ostendit. Folia 8-10 mm longa regulariter falcato-secunda anguste lanceolata in apicem longissimam flexuosam prolongata; nervis inferne ca. 50μ latis breviter excurrentibus apice marginaliter et abaxialiter distincte denticulatis; cellulis 10-12 μ latis, inferioribus valde porosis ad 100μ longis, cellulis superioribus (Fig. 3) plerumque brevibus oblongis vel subquadratis 10-20 μ longis luminibus cellularum laminarum sectione transversa dorso-ventraliter compressis. Caetera ignota.

Type: JUAN FERNANDEZ: Mas a Tierra: Cordon rechts v. Yunque, 500 m, Kunkel 312/4 (Holotype, B; isotype, US). Paratype: JUAN FERNANDEZ: Mas a Tierra: Quebrada Damajuana, 400-450 m, C. & I. Skottsberg M216 (S).

The species is easily distinguished by the very short but large upper leaf cells. The habit is similar to that of Dicranoloma billardieri (Brid.) Par., but the leaf tips are more flexuous. The differences in areolation and leaf tip indicate that the new species is not particularly closely related to either D. billardieri or any other species in the area.

Thamnobryum

The recent study indicates that there are five distinct species of the genus in Juan Fernandez. The older name for the genus, Thamnium B.S.G., is a later homonym and transfers to the genus Thamnobryum Nieuwl. are necessary. The five species from Juan Fernandez are as follows. Thamnobryum carolii (Broth.) H. Robinson, new comb., basionym: Thamnium carolii Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2: 431. 1924. Thamnobryum confertum (Mitt.) H. Robinson, new comb., basionym: Porotrichum confertum Mitt., Rep. Sc. Res. Voyage Challenger Bot. 1 (4): 81. 1885. Thamnobryum ingae (Broth.) H. Robinson, new comb., basio-

nym: Thamnium ingae Broth. in Skotts., Nat. Hist. Juan Fernandez 2: 432. 1924. Thamnobryum proboscideum (Broth.) H. Robinson, new comb., basionym: Thamnium proboscideum Broth. in Skotts., Nat. Hist. Juan Fernandez 2: 433. 1924. Thamnobryum rigidum (Mitt.) H. Robinson, new comb., basionym: Porotrichum rigidum Mitt., J. Linn. Soc., Bot. 12: 467. 1869. The latter species is compared with the closely related New Zealand species, Thamnobryum pandum (Hook.f. & Wils.) Stone & Scott.

Duseniella

The genus Duseniella Broth. has been placed in the family Meteoriaceae but examination shows that the genus has little in common with that family. On the contrary, the genus has all the characters of the Hookeriaceae including undifferentiated alar cells, double costae and furrowed peristome teeth. The calyptrae are short and conical with sparse hairs. Unfortunately, the name Duseniella is preoccupied and the following change is necessary:

Bryodusenina H. Robinson, nom. nov. for Duseniella Broth., Nat. Pfl. 1 (3): 812. 1906, not Duseniella K. Schum in Just, Jahresb. 23 (1): 475. 1902. The genus contains one species, Bryodusenina genuflexa (C. Müll.) H. Robinson, new comb., basionym: Pilotrichum genuflexum C. Müll., Linnaea 18: 676. 1845. The species can be most easily recognized by its slender zigzag leaf tip with prominent retrorse serrations.

Achrophyllum

The new name Achrophyllum Vitt & Crosby was provided recently (1972) for the genus treated by Brotherus under the name Pterygophyllum. Three species occur in Juan Fernandez and two of these have not yet been transferred. Achrophyllum anomalum (Schwaegr.) H. Robinson, new comb., basionym: Racopilum anomalum Schwaegr., Sp. Musc. Suppl. 3 (2): 278. 1830. Achrophyllum tenuinervis (Broth.) H. Robinson, new comb., basionym: Pterygophyllum tenuinerve Broth. in Skotts., Nat. Hist. Juan Fernandez 2: 435. 1924.

Sematophyllum

Sematophyllum kunkelii H. Robinson, new species. Planta dioica mediocrius luteo- vel aureoviridis. Caules prostrati ad 6 cm longi irregulariter dense multoramati. Folia subsecunda ca. 2 mm longa 0.35 mm lata oblongo-ovata leviter concava sensim anguste rigide acuminata margine erecta vel inferne incurva superne leniter serrulata, nervis nullis, cellulis mediis linearibus 6-7 μ latis 60-80 μ longis apicalibus sensim brevioribus ad 25 μ longis basilaribus luteis ad 40 μ longis porosis alaribus

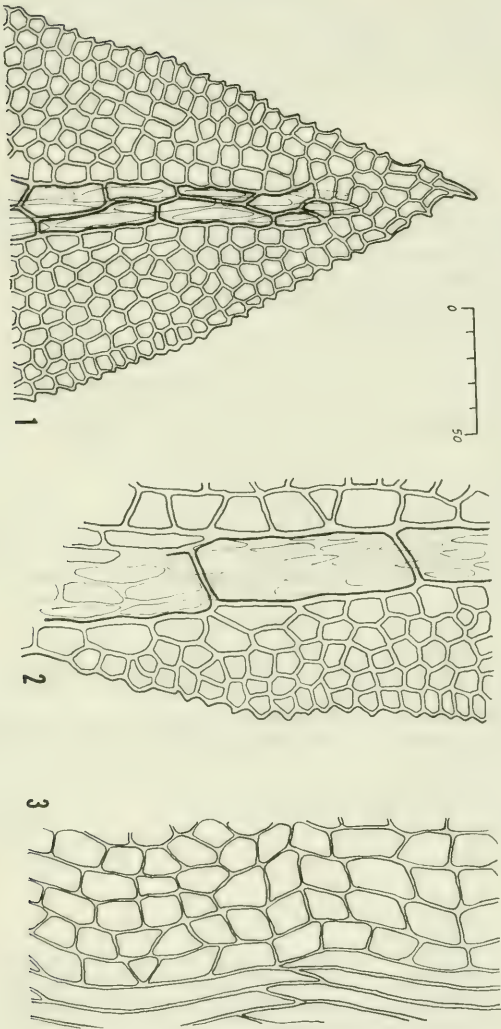
prominentibus 2-3 × 4-5 seriatis hyalinis vel luteolis majoribus rectangularibus 25_μ latis 75_μ longis, cellulis alaribus superioribus foliorum veterum saepe rhizoidea producentibus. Folia perichaetialia ad 1.5 mm long oblongo-ovata apicibus ca. 0.25 mm longis abrupte aliquantum breve acuminatis margine distincte dense minute dentata, cellulis apicalibus ca. 25_μ longis. Setae ca. 10 mm longae rubescentes laeves. Capsulae suberectae ovaes inoperculatae ca. 1.5 mm longae. Sporae 12-15_μ diam. minute papilloae.

Type: JUAN FERNANDEZ: Mas a Tierra: Wand Damajuana, Nordgrat, 550 m, freistehend, Kunkel 317/18a (Holotype, B; isotype, US). Paratypes: JUAN FERNANDEZ: Mas a Tierra: Cordon rechts v. Yunque, Muster vom Waldboden in 500 m Höhe, Kunkel 312/3b (B); Quebrada Damajuana, 400-450 m, Skottsberg M208 (S); Forests of Villagra, 400-550 m, Skottsberg M232 (S).

The species seems to be endemic to Mas a Tierra. Material was reported by Bartram (1957) as Sematophyllum masafueriae, and the species is very closely related. Sematophyllum kunkelii differs by its smaller and less lustrous leaves.

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Mosses of Juan Fernandez. Figures 1-2. Fissidens ornaticostatus H.Robinson; 1. Leaf tip; 2. Base of leaf. Figure 3. Dicranoloma kunkelii H.Robinson, upper leaf cells near margin.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXIX.

A NEW GENUS, VITTETIA.

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One of the largest elements of the Eupatorieae is a series that has been termed in these studies as "Gyptoid". These relatives of the genus Gyptis Cassini are usually marked by more than 5 flowered heads, by a simple glabrous style base and papillose style branches, and by annulately ornamented cells of the anther collar. The series includes some non-conforming genera such as Neocuatrecasia R.M.King & H.Robinson or Dasycondylus R.M.King & H.Robinson and is related to the Disynaphioid and Eupatorioid series all of which reach their greatest development in the eastern parts of North and South America. The entire complex gives every indication of considerable age and diversity and there seem to be many isolated genera. One such isolated genus is described on the basis of the common Eupatorium orbiculatum DC. of southern Brazil.

The species has been recognized in the past primarily by the slender erect rarely branched stems with close-set, short-petioled, opposite, suborbicular leaves. The plant is thinly covered by short glandular punctations and short erect hairs. Details of the heads provide a number of more significant details including minutely pubescent receptacles, achenes with 7-10 ribs, corollas with narrow tubes and flaring bases, the very thick-margined smooth lobes and stylar appendages with crowded sharp papillae. Closest relationship may be to the genera Urolepis (King & Robinson, 1971) and Gyptidium (King & Robinson, 1972) which also have corollas with narrow tubes of less tapering form. These latter differ not only in the more campanulate less trumpet-shaped corolla limbs but also in the inflated to rounded tips of the apical cells of the pappus setae and by the 5 ribs of the achenes. Gyptidium differs further by the papillose or mamilllose surfaces of the corolla lobes. Urolepis differs by the greatly expanded receptacles bearing 100-150 flowers, the extremely long papillae on the style branches and the large carpodium with large thin-walled cells.

The new genus is named for Dr. Nelly Vittet who was coauthor with Dr. Cabrera on the treatments of the Vernoniaceae and Eupatorieae for the Compositae Catharinenses (1961).

Vittetia R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Suffrutices erecti base lignosi multo ramosi. Caules teretes minute puberuli, pilis saepe ad apicem glanduliferis. Folia opposita perbreviter petiolata, laminis orbiculatis vel late ovatis obtusis crenato-serratis puberulis et glanduliferis base distincte trinervatis, nervis lateralibus ascendentibus. Inflorescentiae profuse late corymbosae; pedicelli interdum elongati graciles. Involucri squamae subimbricatae ca. 15 parum inaequilongae oblongo-lanceolatae extus puberuli et glanduliferae; receptacula plana minute puberula. Flores ca. 12 in capitula; corollae anguste infundibulares inferne sensim anguste tubulares extus profuse glanduliferae, cellulis elongatis, parietibus plerumque distincte sinuatis, lobis parum longioribus quam latioribus laevibus integris; filamenta antherarum in parte superiore aliquantum angustata, cellulis oblongis vel longioribus, parietibus parum annulate ornatis, appendices oblongae parum longioribus quam laterioribus; styli inferne glabri non nodulosi, appendicibus linearibus dense argute papillo-sis; achaenia prismatica 7-10 costata dense glandulifera; carpopodia parva prominula, cellulis minutis subquadratis 3-4-seriatis, parietibus tenuibus vel parum incrassatis; pappus setiformes uniseriatus, setis ca. 30-40 scabrellis superne parum gracilioribus, cellulis apicalibus argute acutis.

Species typica: Eupatorium orbiculatum DC.

The genus contains the following single species.

Vittetia orbiculata (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium orbiculatum A.P. Decandolle, Prodr. 5: 172. 1836. Brazil.

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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXX.

NOTES ON CAMPULOCLINIUM, KOANOPHYLLON,

MIKANIA AND SYMPHYOPAPPUS.

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Recent efforts in the study of the Eupatorieae have indicated four isolated cases needing nomenclatural changes. Three of the plants involved have additional features which seem worthy of mention and illustration.

Campuloclinium campuloclinioides (Baker) R.M.King & H. Robinson, comb. nov. Ageratum campuloclioides Baker, Mart., Fl. Bras. 6(2):196. 1876. Syn. Trichogonia barrosoana Barroso, Arquivo Jard. Bot. Rio de Janeiro 11:13. 1951; Campuloclinium barrosoana (Barroso) R.M. King & H. Robinson, Phytologia 24:404. 1972.

The species has been rejected from various treatments of Ageratum with the suggestion of placement in Trichogonia without proper combination (B.L. Robinson, 1913, Johnson, 1971). A recent recollection by Coleman (1970) was from near the type locality in Goyas, Brazil but collections from farther east in Minas Gerais have been recently described as a new species in the genus Trichogonia by Barroso (1951). Our own studies had already shown the later species to be a Campuloclinium (King & Robinson, 1972). Comparison of the two type specimens loaned through the kindness of the Museo at Rio de Janeiro and Kew show that the two species are identical. The above unfortunate combination is necessary.

Koanophyllon lobatifolia (Cabrera) R.M.King & H. Robinson, comb. nov. Eupatorium lobatifolium Cabrera in Cabrera & Vittet, Sellowia 15:192. 1963.

The species has unusually lobed leaves with eccentrically placed secondary veins. The sinuses of the leaves occasionally reach the midrib near the base of one of the secondary veins and in some cases a secondary vein runs directly to the end of a shallower sinus where it divides. The basal lobes often have two secondary veins running parallel with little apparent orientation to the margin of the lobe. The venation contrasts greatly to that shown in the illustration accompanying the original description (Cabrera & Vittet,

1963). The unusual leaves of the plant do not detract from the completely Koanophyllon type of corollas, anthers, and styles. The anther appendages are short and grooved in the middle as noted in typical Koanophyllon species. The only feature of the genus that is not evident is the paniculate inflorescence, but the present material has such a sparing inflorescence that the basic structure cannot be determined.

Mikania iltisii R.M.King & H.Robinson, nom. nov.

Mikania standleyi R.M.King & H.Robinson, *Phytologia* 28: 272. 1974. not M. standleyi B.L.Robinson, *Contr. Gray Herb.* n.s. 77: 59. 1926, also of Costa Rica. The species is here renamed for Dr. Hugh Iltis, a collector of the paratype specimen.

Symphypappus catharinensis (Cabrera) R.M.King & H. Robinson, comb. nov. Eupatorium catharinense Cabrera in Cabrera & Vittet, *Sellowia* 15: 197. 1963.

The species shares almost all features of the genus as circumscribed by King & Robinson (1971b). The one character by which the species is distinct from all others, the ten flowers per head, represents a doubling of the five flowers per head that is otherwise characteristic of the entire Disynaphioid Complex (King & Robinson, 1971a).

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Acknowledgement

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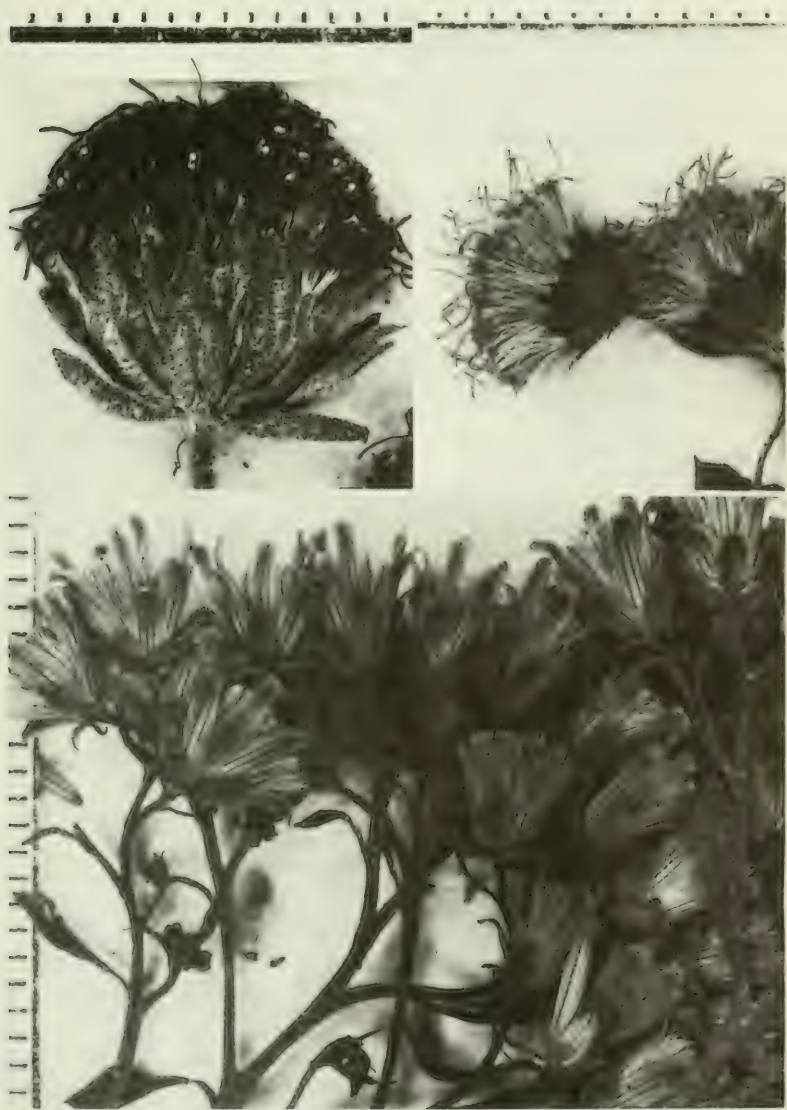
Campuloclinium campuloclinioides (Baker) R.M.King & H.Robinson, Holotype of Ageratum campuloclinioides Baker, Kew. This and following photographs by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Koanophyllon lobatifolium (Cabrera) R.M. King & H. Robinson, Holotype, Laplata.



Symphyopappus catharinensis (Cabrera) R.M. King &
H. Robinson, Holotype, Laplata.



Enlargements of Heads. Upper left; Campuloclinium campuloclinioides. Upper right; Koanophyllon lobatifolium. Bottom; Symphyopappus catharinensis.

NOTES ON THE GENUS CLITORIA (LEGUMINOSAE) IN PANAMA

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There are 6 species of Clitoria in Panama. Several problems concerning delimitation of these species throughout their range, as well as problems of nomenclature, have prompted this discussion of Panamanian species of Clitoria. A key to these species follows:

A. Leaves 5-9 foliate

Clitoria ternatea L. 1.

A. Leaves 3-foliate:

B. Plants herbaceous or at most suffruticose, not lianas or trees:

C. Stems and petioles glabrous or nearly so; reticulate veins prominently raised on both surfaces; plants usually unbranched

Clitoria guianensis (Aubl.) Benth. 4.
var. subsessilis (Rose) Croat

C. Stems and petioles conspicuously pubescent; reticulate veins not at all raised; plants often branched:

D. Leaf blades acuminate at apex; calyx less than 1.5 cm long

Clitoria multiflora Mart. & Gal. 3.

D. Leaf blades rounded to retuse at apex; calyx more than 2 cm long

Clitoria rubiginosa Juss. 2.

B. Plants lianas, shrubs or trees:

E. Lianas; flowers

cauliflorous; calyx ca. 2.5 cm long; standard white or pinkish, with reddish stripes, 5-8 cm long; fruits usually conspicuously and densely pubescent, dark brown, more than 20 cm long; flowering mostly December to May.

Clitoria javitensis (H.B.K.) Benth. 5.

* Credit is given to Mr. Paul R. Fantz, University of Florida, a student of Clitoria, who reviewed the manuscript and gave helpful suggestions.

- E. Shrubs or trees, usually more than 6 m tall; flowers cauliferous; calyx 1.5 cm long; standard violet (keel & wing petals white), less than 2.5 cm long; fruits glabrate, tan, less than 15 cm long; flowering July to December
Clitoria glaberrima Pittier 6.

1. Clitoria ternatea L., a native of the Old World tropics, is now widespread in cultivation throughout the New World tropics, but especially in areas flanking the Caribbean.

2. Clitoria rubiginosa Juss. ranges throughout the New World tropics. Clitoria glycinoides DC., a name commonly used in the West Indies and South America, is a synonym. Clitoria rubiginosa is found in disturbed open areas in Panama, in tropical dry forest, premontane moist forest, and tropical moist forest along the Pacific slope (Holdridge Life-Zone System).

3. Clitoria multiflora Mart. & Gal. is known in Panama only from Chiriqui Province in Western Panama. It was collected in premontane wet forest. I am not familiar with this species. It is possible that it should be referred to as C. polystachya Benth., which is a slightly older name than C. multiflora.

4. Central American plants going by the name Clitoria guianensis (Aubl.) Benth. and West Indian plants called either Clitoria cajanifolia (Presl) Benth. or C. laurifolia Poir. (a synonym of C. cajanifolium) are subspecifically distinct from C. guianensis. Recognition of this taxon was first made by Rose (1899) in a discussion of Mexican Clitoria. The taxon is, however, not distinct at the level of species and the following recombination is therefore proposed.

Clitoria guianensis (Aubl.) Benth.

var. subsessilis (Rose) comb. novo.

Clitoria subsessilis Rose,

Contr. U.S. Natl. Herb. 5: 169. 1899. Lectotype
Nelson 2748 (US).

Clitoria guianensis var. subsessilis ranges from Mexico to Panama and is also found in the West Indies. In Panama the species occurs in savannas and roadsides on the Pacific slope in tropical dry forest and premontane moist forest. Clitoria guianensis var. subsessilis appears to be morphologically intermediate between C. guianensis var. guianensis and C. cajanifolia. It differs from the typical variety of C. guianensis principally in having usually broader leaflets which are dull and glaucous beneath. Clitoria guianensis has leaves which are slender (usually less than 1.5 cm broad), shiny and not glaucous on lower surface. Clitoria guianensis

var. subsessilis has leaves which are similar to C. cajanifolia in superficial appearance but that species has the lower blade surface much more pubescent. Clitoria cajanifolia also differs greatly in habit. Plants are usually much larger (usually much more than a meter tall) and they are also often more or less scandent. Both the typical variety of C. guianensis and the var. subsessilis are short suffrutescent plants usually about 30 cm tall.

Bentham (1858) in his brief monograph of Clitoria reported C. cajanifolia for both South America and the West Indies but did not mention the glaucous condition of the leaves. I assume that his descriptions were based principally on South American collections of C. cajanifolia rather than on West Indian collections.

5. The two remaining species of Clitoria in Panama, C. javitensis (H.B.K.) Benth. and C. glaberrima Pittier, have long been confused with each other, despite their very obvious differences. Clitoria javitensis (H.B.K.) Benth. has undergone a series of nomenclatural changes in Panama. It was long called C. arborescens Ait., a species from St. Vincent (Lesser Antilles), Trinidad, and the Guianas. Later it was considered a distinct species and called C. portobellensis Beurl., the type of which is from Panama in Colon Province. It has now become obvious however after studying specimens from throughout its range that the Panamanian material is not distinct from South American plants going by the older name C. javitensis (H.B.K.) Benth. It is possibly not distinct from C. leptostachya Benth., also a South American species.

Clitoria javitensis (H.B.K.) Benth., as now considered to include C. portobellensis Beurl., thus ranges from Panama to Colombia, the Guianas, northern Brazil, Peru, and Ecuador. This is in agreement with Amshoff in her 1939 treatment of the Papilionaceae for the Flora of Surinam where she included Central America in the range of C. javitensis. On the other hand, she made no mention of C. portobellensis.

Clitoria javitensis is usually a slender liana with a stem usually no more than 1.5 cm diam. It occurs in densely forested areas of tropical moist forest. In Panama it is known from the Atlantic slope of the isthmus in the vicinity of the Canal Zone, in the Perlas Islands in the Gulf of Panama (Panama Province) and in Darien Province. The species rarely occurs in open areas such as those reported by Johnston in the Flora of San Jose Island. Possibly the area was a disturbed site and the plants were merely persisting there after the forest had been removed. In such cases where the plant has been found in open areas it may form an erect shrub, no doubt the result of a loss of support.

Clitoria javitensis possibly flowers and fruits to some extent all year but flowers have been seen only from October to May. Flowering is at its peak in the dry season from December to May. Mature fruits have been seen from January to May.

Because of the long standing confusion in Panama between C. javitensis (H.B.K.) Benth. and Clitoria glaberrima Pittier, the following exsiccatae is given for Panamanian specimens of both species. All specimens are at the Missouri Botanical Garden Herbarium (MO) unless otherwise indicated.

Clitoria javitensis (H.B.K.) Benth.

CANAL ZONE: Barro Colorado Island: Aviles 85; Croat 4216, 4615, 4853, 4967, 5067, 5285, 5333, 5595, 6605, 6734, 7071, 7077, 7091, 7340, 7732, 7929, 8289, 8497, 8905, 9310, 12847; Dwyer 8452; Killip 40034; Shattuck 312; Standley 41137 (US); Wetmore & Abbe 6, 6A; Wilson 23, Woodworth & Vestal 675; Frijoles, Croat 13223; Las Cascadas Plantation, Standley 29557 (US), 29757 (US); Darién Station, Standley 311630 (US), 311634 (US); Between France Field and Catival, Standley 30327 (US), 30429 (US); Vicinity of Ft. Sherman, Standley 31058 (US); Vicinity of Gamboa, Allen 3931; Gamboa Pipeline Road on Tropic Test Center land, M. Correa A. & B. L. Haines 481; Obispo, Standley 31689 (US); Río Paraiso above E. Paraiso, Standley 29893 (US); Westerly arm of Quebrada Salamanca, Dodge, Steyermark & Allen 17007. CHIRIQUI: Remedios and vicinity, Pittier 5469 (US). COLON: Juan Mina plantation, Río Chagres, Region above Gamboa, Allen 4114. DARIEN: Mannene to mouth of Río Cuasi, Kirkbride & Bristan 1402; Vicinity of Piñas, Duke 10617; Río Sambú 0-5 mi above Río Venado, Duke 9262; Tucutí, Chepigana District, Terry & Terry 1372. PANAMA: Sabanas near Chepo, Hunter & Allen 92; Isla del Rey, Duke 9529; San José Island, Erlanson 29 (US), I. Johnston 670 (MO, US); Taboga Island Standley 27915 (US). VERAGUAS: Isla Coiba, A. Mendez 143 (US).

6. Clitoria glaberrima Pittier is reported here for Panama for the first time. It was known previously only from Venezuela. It apparently has a more restricted range than C. javitensis in Panama. It is known only from drier parts of tropical moist forest in the Canal Zone near Madden Lake, and along the Pacific Ocean and from the tropical dry forest in Panama Province, on Isla Tabaguilla and in Los Santos Province. It is also known from premontane moist forest in the Canal Zone. Clitoria glaberrima is always a shrub or tree 3.5-13 m tall. It flowers during the rainy season from July to December. The fruits mature from October to January.

Clitoria glaberrima Pittier (All MO)

CANAL ZONE: Farfan Beach area, Tyson 1833, 1839; Tyson & Blum 2606, 2618, 2619, 2620; Tyson, Dwyer & Blum 3172; Madden Dam, Alt. 50 ft. Lewis, Dwyer & Elias 8; Woodson, Allen & Seibert 1553; Correa & Dressler 353; Madden Dam, Boy Scout Camp Road, Dwyer 8387, 9166; Hill above Thatcher Ferry Bridge, Croat 17012. PANAMA: Isla Tabaguilla, Duke 5882. LOS SANTOS: Las Tablas, Dwyer 1180.

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CERTAMEN MELASTOMATACEIS XXIII.

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LAVOISIERA ORDINATA Wurdack, sp. nov.

In systemate Cogniauxii L. bicolori Naud. ex descr. et photic. affinis, foliorum pubescentia densiore floribus 5-meris differt.

Frutex 0.5-2 m. Ramuli primum quadrati et breviuscule (alis 0.5 mm) 4-alati demum teretes sicut folia sepala extus hypanthiaque dense setulosi, pilis 0.5-1 mm longis erectis vel paulo appressis caduce glanduliferis (in folia ca. 8-10/mm quad.) laevibus et modice vel densiuscule glandulis aureis armati. Folia sessilia patentia laxe conferta, (0.5-)0.8-1.4 cm longa lataque ovati-orbicularia vel ovata, apice late acuto vel obtuso basi paulo (0.5-2 mm) cordata 3(-5)-nervata nervulis invis. Flores 5-meri ad ramorum apices pauciglomerati, pedicellis ca. 0.5 mm longis. Hypanthium (ad torum) 3.5-4 mm longum inconspicue 10-costulatum; calycis tubus 0.3 mm longus, lobis 1-2(-2.8) mm longis triangularibus apicibus unisetiferis intus glabris et resinoso-glandulosis. Petala roseo-rubra 8-9.5 X 5.5-5.8 mm obovata apice unisetuloso setula caduce glandulifera alioqui glabra. Stamina dimorphica glabra; filamenta 3.7-4.2 mm longa; antherarum thecae (rostris exclusis) 3.3 vel 1.8 mm longae rostris 0.6-0.7 mm longis; connectiva 4-5 vel 0.7-1 mm prolongata, appendicibus ventralibus 1.2 X 0.7-1.1 vel 0.3-0.4 X 0.2-0.4 mm rotundatis vel paulo emarginatis. Stigma punctiforme; stylus 5.5 X 0.4-0.6 mm glaber; ovarium (4-)5-loculare apice 5-lobulato ca. 0.5-0.7 mm circum stylum prolongato; semina 0.7 X 0.3-0.4 mm paulo curvata in lineis paululo foveolata.

Type Collection: H. S. Irwin, J. W. Grear, Jr., R. Souza, & R. Reis dos Santos 12695 (holotype US 2530439; isotype NY), collected on rocky slopes of Chapada dos Veadeiros, 15 km west of Veadeiros, Goiás, Brazil, elev. 1000 m, 12 Feb. 1966. "Shrub to ca. 2 m tall. Corolla rose-red."

Paratypes (all from Chapada dos Veadeiros, elev. 1000-1200 m): E. Y. Dawson 14597; Irwin, Souza, & Reis dos Santos 9311; Irwin, Grear, Souza, & Reis dos Santos 12660; Irwin, Harley, & Smith 32750.

From the plane leaves, fine glandular pubescence, and short persistent calyx lobes, L. ordinata would key to spp. 24-26 of Cogniaux' Monograph, differing from them in the 5-merous flowers. Both L. nervulosa Naud. and L. selleana Cogn. have larger (2-4.5 cm long) leaves, while the pubescence of L. bicolor (Macbride photograph 36111) is obviously much sparser. The Dawson collection of the Veadeiros species puzzled me several years ago (cf. Los Angeles Co. Mus. Contr. Bot. 28: 7. 1959), but I feel

somewhat more intrepid now. In general aspect (leaves and glandular pubescence), L. ordinata resembles Microlicia pilosissima Cogn.; however, the type collection of that Serra da Lapa species (Riedel 1350, LE) has a 3-celled ovary with an essentially truncate apex. I have seen no recent collections of M. pilosissima.

LAVOISIERA QUINQUENERVIS Wurdack, sp. nov.

In dispositione Cogniauxii sectionis Cataphractae omnibus speciebus foliis 5-nervatis differt.

Ramuli sicut folia calycis lobi extus hypanthiaque primum inconspicue glandulis clavatis 0.05-0.1 mm longis sparsiuscule induti mox glabrati, in ramulis inter petiolos inconspicue setulosi, internodiis glandulis caducis exceptis glabris. Folia sessilia laxe conferta subplana, 0.8-1.5 X 0.5-0.9 cm ovata, apice setuloso-acuminato, basi truncata vel paulo amplexante, marginibus exceptis glabrata modice ciliata ciliis rigidiusculis laevibus plerumque 1-1.5 mm longis et 0.7-1 mm inter se distantibus caduce glanduliferis, 5-(vel inflorescentiam versus usque ad 9-) nervata, nervis subtus obtuse elevatis nervulis invisis. Flores 6-meri in ramulis terminalibus solitarii; hypanthium (ad torum) 6 mm longum glandulis caducis exceptis glabrum; calycis tubus 0.7-1 mm longus, lobis 7-8 X 2.5-2.7 mm anguste oblongis (apice anguste acuto) post anthesim deciduis, ad margines ciliis glanduliferis 1.5-3 mm longis ornatis alioqui glabris. Petala 20-25 X 12-15 mm oblongo-obovata rotundata sparse glanduloso-ciliolata, ciliis 0.05-0.1 mm longis, apice unisetoso seta laxa 2-2.5 mm longa. Stamina dimorphica glabra; filamenta 8 vel 6 mm longa; antherarum thecae (rostris exclusis) 5 vel 4 mm longae, rostris 0.5-0.7 mm longis; connectiva (usque ad filamentum insertiones) 7-7.5 vel 2-2.5 mm prolongata, appendicibus ventralibus 1.5 X 1 vel 1 X 0.7 mm emarginatis. Stigma punctiforme; stylus 13 X 0.5-0.7 mm glaber; ovarium 6-loculare glabrum.

Type Collection: H. S. Irwin, R. Souza, & R. Reis dos Santos 11197 (holotype US 2530443; isotype NY), collected on the campo slope immediately east of Lagoa Paranoá, Distrito Federal, Brazil, elev. 975 m, 11 Dec. 1965. "Shrub ca. 1 m tall, much branched. Corolla magenta; anthers yellow, the connectives scarlet."

In Cogniaux' Monograph, the rigid leaf ciliation would indicate Sect. Cataphractae; in the species group with 3-nerved leaves, all (ex descr.) have much smaller petals 10-15 mm long as well as individual pubescence and other differences. Actually L. quinquenervis somewhat bridges the gap between Sections Cataphractae and Gentianoideae, but has much stiffer cilia than the species of Sect. Mucorosae (indicated by de Candolle as the gap-bridging group in foliar pubescence). All of the species of Sect. Mucorosae with deciduous calyx lobes have at least the young leaves glandular-setulose beneath and the calyx lobes glandular-setulose externally. From the Macbride photograph (16670), Glaziov 21311, the basis of a nomen nudum, is probably the same as Irwin et al 11197. To conserve the type material,

all floral dimensions given for L. quinquenervis were taken from dry flowers.

RHYNCHANThERA CONSIMILIS Wurdack, sp. nov.

R. roseae Cogn. affinis, hypanthiis sparse glanduloso-setulosis calycis lobis brevioribus differt.

Ramuli primum quadrangulati demum teretes sicut inflorescentia sparsissime caduceque glanduloso-setulosi pilis ca. 0.5 mm longis. Petioli 0.3-0.6 cm longi glabri; lamina 2.5-7 X 0.3-0.8 cm anguste lanceato-oblonga utrinque acuta, rigidiuscula et minute serrulata dentibus ca. 0.1 mm altis et 0.5 mm inter se distantibus, supra et subtus glabra, trinervata (foliis inferioribus indistincte 5-nervatis) nervis secundariis ca. 1 mm inter se distantibus supra invisibilibus nervulis plerumque non evolutis. Panicula submultiflora; flores 5-meri in ramulis subsecundi, bracteis parvis usque ad 3 mm longis ellipticis, pedicellis ca. 1 mm longis. Hypanthium (ad torum) 4.5 mm longum basim versus sparse glanduloso-setulosum, pilis 0.3-0.5 mm longis, apicem versus glabrum; calycis tubus 0.5 mm altus, sinibus extus glabris, lobis 3 mm longis subulatis minute (0.05 mm) glanduloso-ciliolatis, apice unisetuloso setula 0.1-0.2 mm longa. Petala 14 X 9 mm obscure (0.05 mm) glanduloso-ciliolata obovato-elliptica, apice late acuto vel obtuso. Stamina maiorum: filamentum 8 mm longum; antherae thecae (rostro excluso) 6 X 1.2 mm, rostro 3 X 0.25 mm, connectivo 12.5 mm prolongato parte apicali per 4 mm ca. 1.5 mm lata parte basali 0.7 mm lata. Stamina minora: filamenta 5.5 mm longa; antherarum thecae (rostris exclusis) 5 X 1 mm, rostro 3 X 0.25-0.3 mm, connectivo 4.5 mm prolongato 0.3 mm lato. Staminodia 4 X 0.2-0.3 mm linearia. Stylus 18 X 0.4-0.3 mm glaber; ovarium 3-loculare apice inconspicue (0.05 mm) glanduloso-puberulo.

Type Collection: H. S. Irwin, J. W. Grear, Jr., R. Souza, & R. Reis dos Santos 15649 (holotype US 2530431; isotype NY), collected in wet campo near gallery forest of the Rio Torto, ca. 10 km northeast of Brasília, Distrito Federal, Brazil, elev. 975 m, 6 May 1966. "Shrub ca. 1 m tall. Corolla magenta. Fruit purple."

The Paraguayan relative has more sharply angled stems, essentially glabrous (very sparsely glandular-setulose with caducous hairs 0.2 mm long) hypanthia with single toral setulae in the calyx sinuses, and calyx lobes 5-7 mm long. Rhynchanthera verbenoides Cham., R. ternata Cogn., and R. linearifolia Hoehne (the latter two ex char.) differ at least in the 5-nerved leaves hispid on the nerves beneath and setulose (except R. ternata) longer calyx lobes.

POTERANTHERA ANNECTANS Wurdack, sp. nov.

Differt a P. pusilla antherarum fertilium thecis non truncatis connectivis magis prolongatis, staminodiis evolutis.

Herba 10-25 cm alta plerumque superne ramosa, caulis ramulorumque internodiis glabris quadrangulatis nodis setis laevibus glanduliferis paucis ca. 1 mm longis armatis. Folia

sessilia 7-13 X 0.4-0.6 mm uninervata distanter ciliato-serrulata, ciliis glanduliferis 0.7-1 mm longis, vel interdum integra alioqui glabra. Flores numerosi in ramulis terminales 5-meri; pedicelli 0.5 mm longi glabri. Hypanthium 1.4 X 0.7-0.9 mm infra torum constrictum glabrum; calycis tubus 0.1-0.15 mm longus, lobis subulatis 1 mm longis (seta exclusa) seta unica glandulifera 0.8 mm longa terminatis interdum setulis paucis glanduliferis marginalibus vel intersepalis armatis. Petala 5 X 2 mm obovato-oblonga, apice abrupte acuto et seta unica glandulifera 0.4 mm longa terminato alioqui glabra. Stamina fertilia: filamenta 2.3 mm longa glabra; antherarum thecae 1.6 X 0.45 X 0.5 mm subulatae poro 0.1 mm diam. ventraliter inclinato; connectivum 0.8-1 mm prolongatum, appendice ventrali 0.35 X 0.35 mm hebeti. Staminodia: filamenta 2 mm longa glabra; thecae steriles 0.4 X 0.1 mm, connectivo 0.2 mm prolongato, appendice ventrali 0.15 X 0.15 mm. Stigma truncatum; stylus 5.8 X 0.15 mm glaber; ovarium 3-loculare superum glabrum; semina subcochleata muricata 0.4 X 0.25 mm.

Type Collection: H. S. Irwin, J. W. Grear, Jr., R. Souza, & R. Reis dos Santos 16322 (holotype US 2504187; isotype NY), collected at gallery forest margin about 86 km north of Xavantina, Mato Grosso, Brazil, elev. 550 m, 31 May 1966. "Herb ca. 10 cm tall. Corolla lavender-purple; anthers yellow. Common."

Paratypes (both Mato Grosso, Brazil): Irwin, Souza, Grear, & dos Santos 16977, from periodically flooded campo ca. 30 km south of Xavantina, elev. 400 m; Ratter, de Santos, Souza, & Ferreira R-1364, from ca. 270 km north of Xavantina.

The few collections of P. pusilla are much less robust plants with broad-pored anthers only 0.7 mm long, connectives prolonged only 0.1 mm, and staminodia not developed; in other qualitative features, the two species are alike. I have recently examined Riedel 1034 (LE) and have again confirmed the absence of staminodia in P. pusilla; the illustrations from both Bongard and Flora Brasiliensis are accurate in floral details. The presence of staminodia in P. annectans negates one of the distinctions from Acisanthera (cf. Fieldiana Bot. 29: 541. 1963), but the combination of other characters still seems at present to warrant generic differentiation.

In his original publication of P. pusilla, Bongard cited the collector as Langsdorff, the month of collection as October. Riedel was the botanical collector on Langsdorff's folly-ridden expedition across central Brazil and down the Amazon; the only collection cited by Cogniaux in Flora Brasiliensis was Riedel 1034, which however was collected (fide the label) in May 1827. As listed in the first volume of Flora Brasiliensis, Riedel's itinerary at that time is rather vaguely defined, but the "S. da Chapada" is evidently near Cuiabá in Mato Grosso, rather than in Goiás.

TIBOUCHINA STELLIPILIS Wurdack, sp. nov.

Sect. Pleroma. A sectionis speciebus mihi cognititis foliis

subtus pilis stellatis dense indutis differt.

Ramuli primum rotundato-quadrangulati mox teretes sicut petioli foliorum subtus venae primariae bracteae hypanthiaque modice strigosi, pilis laevibus (0.5-)1-1.5(-2) mm longis. Petioli 0.6-1 cm longi; lamina tenuiter coriacea 3-5 X 1.5-2.5 cm elliptica vel ovato-elliptica, apice acuto, basi obtusa vel rotundata, 5-nervata paribus exterioribus usque ad basim liberis vel paulo (0.5-1 mm) coalitis nervis secundariis nervulisque subtus ob pilos occultis, supra modice bullato-strigosa pilorum basibus expansis sparse barbellatis 0.5 mm latis apicibus seta laevi unica 0.7-1 mm longa ornatis, subtus in superficie pilis stipitato-stellatis (stipite ramisque plerumque 0.1-0.2 mm longis) dense induta in venulis pilis paulo supra basim stellatis distaliter per 0.7-1 mm laevibus sparse vel modice ornata. Panicula pauciflora ca. 3 cm longa; flores 5-meri, pedicellis 2-3 mm longis, bracteis 3-5 mm longis ellipticis caducis. Hypanthium (ad torum) 5.5 mm longum; calycis tubus 0.8 mm longus, lobis 2.3 X 1.7 mm ovatis acutis ad basim contiguus. Petala densiuscule pilis eglandulosis 0.2-0.4 (-0.5) mm longis ciliolata 9-9.5 X 7-7.2 mm obovata apice rotundato-truncato. Stamina paulo dimorphica; filamenta 8 vel 5.5 mm basim versus modice pilis glanduliferis 0.3-0.7 mm longis puberula; antherarum thecae subulatae 7.2 vel 6.8 X 0.7 mm; connectivum 1 vel 0.4 mm prolongatum ventraliter paulo bilobulatum. Stigma truncatum; stylus 16 X 0.6-0.4 mm centraliter sparsissime pilis appressis eglandulosis ornatus; ovarii apex dense pilis laevibus 1-1.5 mm longis eglandulosis sericeo-strigosus.

Type Collection: G. T. France 4806 (holotype US 2521350; isotype NY), collected at the base of sandstone cliffs, Serra Morro do Chapéu, Carolina, Maranhão, Brazil, 29 March 1967. "Subshrub; corolla pale purple."

Tibouchina stellipilis would key in Cogniaux' monograph to species 78-80 (all with gland-tipped hypanthial hairs and smooth vegetative pubescence) or species 81-83 (with much sparser smooth pubescence on the lower leaf surfaces). Minutely roughened ("pinoid") foliar hairs among Brazilian species are found in T. formosa Cogn., T. nervulosa Cogn., T. castellensis Brade, and species 57-60, but none of these have truly stellate hairs with long arms.

TIBOUCHINA LAEVICAULIS Wurdack, sp. nov.

Sect. Pleroma. In systemate Cogniauxii, T. litorali Ule affinis, caulibus laevibus vel sublaevibus petiolis laminisque longioribus differt.

Frutex pauciramosus 1.5-3.5 m altus. Ramuli floriferi primum sulcato-quadrangulati demum teretes, nodis exceptis glabri; ramuli non floriferi sparse strigulosi. Petioli 0.8-2 cm longi sicut nodi laminae supra pedicelli hypanthiaque dense strigulosi, pilis 0.7-1.4 mm longis subgracilibus densiuscule minuteque barbellatis; lamina 5-13 X 2-5.5 cm rigidiuscula oblongo-elliptica vel oblongo-ovata, apice acuto basi rotundata, subtus dense setulosa pilis gracilibus minute barbellatis,

5-nervata nervis secundariis ca. 1.5-2.5 mm inter se distantibus. Panicula oblonga ca. 15 cm longa submultiflora, axe principali nodis exceptis glabro; flores 5-meri, pedicellis 5(-7) mm longis, bracteis duabus anguste ovatis 5 mm longis ad anthesim caducis ca. 1 mm infra hypanthii basim insertis. Hypanthium (ad torum) 7.5 mm longum; calycis tubus 0.6 mm altus, lobis lanceatis 7-7.5 X 3 mm extus strigulosus intus glabris post anthesim deciduis. Petala ciliolata alioqui glabra 12.5-15.5 X 11-13 mm late obovata, apice rotundato vel paulo emarginato. Stamina paulo dimorphica; filamenta 9 vel 8 mm longa centraliter sparsiuscule glanduloso-puberula; thecae subulatae (poro ventraliter inclinato 0.2 mm diam.) 9 vel 7.5 X 1-1.2 mm, connectivo 1 vel 0.6 mm prolongato ventraliter bilobulato glabro. Stylus 13 X 0.8-0.4 mm glaber; stigma punctiforme; ovarium dense sericeo-strigulosum.

Type Collection: H. S. Irwin & T. R. Soderstrom 5247 (holotype NY; isotype US), collected among rocks on dry slopes of Chapada da Contagem, ca. 20 km east of Brasília, Distrito Federal, Brazil, elev. 700-1000 m, 17 Aug. 1964. "Corolla deep violet."

Paratypes (all D. Federal, Brazil): D. Sucre & E. P. Heringer 537, from Ponte da São Bartolomeu, 17 June 1965; Irwin, Grear, Souza, & dos Santos 15424, from Córrego Taquarí, east of Lagôa Paranoá, elev. 975 m, 28 April 1966; J. M. Pires 58094, from between Brasília and Fercal, 30 June 1964.

Tibouchina litoralis, of which I have examined a probable isotype (Mus. Nac. Rio 114953), has moderately fine-setulose stems, nearly sessile (petiole 0.3-0.5 cm long) leaves with the blade 3-4 X 2-2.5 cm, and styles basally sparsely glandular-puberulous. Tibouchina discolor Brade has smooth trichomes, nearly glabrous upper leaf surfaces, and smaller flowers (anther thecae ca. 5 mm long dry, rather than 7-8 mm). From the photograph (Macbride 16756), Glaziou 21374 is probably T. laevicaulis. Cogniaux had annotated this Glaziou collection as an undescribed species related to T. reichardtiana Cogn.; however that Guanabara species and its relatives all have moderately strigulose stems, gland-tipped calycine hairs, and basally puberulous styles, as well as (at least in T. reichardtiana and T. gaudichaudiana [DC.] Baill.) non-barbellate hairs on the vegetative parts and hypanthia. The leaves of T. laevicaulis are usually opposite; however, in the Córrego Taquarí paratype, the leaves are opposite or ternate.

BRACHYOTUM HARLINGII Wurdack, sp. nov.

B. tyrianthino Macbr. affinis, petalorum ciliis non glandulosis antherarum connectivis exappendiculatis differt.

Trichomata minutissime sparsiusculeque aspera. Ramuli sicut petioli foliorum venae primariae subtus pedicellique densiuscule appresso-setulosi pilis gracilibus ca. 0.6-0.8 mm longis.

Petioli 0.3-0.5 cm longi; lamina (1.2-)1.5-2 X (0.7-)1-1.5 cm, oblongo-elliptica apice obtuso vel rotundato basi rotundata, supra modice laxequ strigulosa pilis gracilibus ca. 1 mm longis, subtus sparsiuscule setulosa pilis gracilibus 0.4-1 mm longis,

trinervata. Flores 5-meri in foliorum superiorum axillis solitarii, pedicellis persistenter bifoliolatis supra foliola ca. 5-8 mm longis. Hypanthium (ad torum) 5 mm longum sicut sepala extus modice laxo-strigosum pilis gracilibus ca. 1-1.3 mm longis; calycis tubus 0.3-0.6 mm longus, lobis 7.3-7.6 X 3.4-3.6 mm oblongo-lanceatis apice acuto intus per ca. 4-4.5 mm sparse strigulosus. Petala ut videtur atropurpurea 15-16 X 12-13 mm obovata asymmetricè truncata ciliis 0.1-0.4 mm longis plerumque eglandulosi. Stamina glabra, filamentis 7 mm longis, antherarum thecis 6.5-6.7 X 1 mm oblongis et paulo subulatis, poro minuto 0.2 mm diam., connectivo exappendiculato. Stylus 24 X 0.4 mm glaber per ca. 6 mm exsertus; ovarii apex per 1.6 mm dense strigosus pilis eglandulosi ca. 0.3-0.8 mm longis, lobis apicalibus vix evolutis ca. 0.2 mm longis.

Type Collection: G. Harling, G. Storm, & B. Ström 8038 (holotype GB), collected at Campamento San Miguel along Sigsig-Gualaquiza road, Prov. Morona-Santiago, Ecuador, elev. 3000 m, 8 April 1968. "Bush 0.5 m high. Inflorescence violet-blue."

Brachyotum tyrianthinum has stouter and more closely appressed stem hairs, glandular corolla cilia, and ventrally appendaged anthers. Among the Ecuadorian species with roughened hairs, B. rugosum Wurdack has 5-nerved leaf blades, 2-3-flowered dichasia, 4-merous flowers, shorter calyx lobes which are glabrous within, and appendaged anthers, while B. rostratum (Naud.) Triana has more expanded upper leaf surface hairs, mostly ternate flowers, sepals glabrous within, glandular petal cilia, and glandular ovary pubescence. None of the near-sympatric Ecuadorian species (B. fraternum Wurdack, B. ecuadorensis Wurdack, B. fictum Wurdack, B. rugosum, B. rostratum) have parental features which would suggest a possible hybrid origin for B. harlingii.

BRACHYOTUM URIBEI Wurdack, sp. nov.

B. rugoso Wurdack affinis, trichomatibus minus asperis ramulorum pilis incurvo-patentibus calycis lobis oblongis differt.

Trichomata basaliter minutissime aspera. Ramuli sicut petioli foliorum venae primariae subtus pedicellique modice incurvo-setosi pilis gracilibus 2-3 mm longis. Petioli 0.7-1.3 cm longi; lamina (3-)4-6.5 X (1.8-)2.5-4.3 cm oblongo-ovata vel oblongo-elliptica apice obtuso basi obtusa vel rotundata, supra paulo rugoso-bullulata et sparsiuscule laxo-strigosa pilis gracilibus 1-2 mm longis, subtus in venis secundariis venulisque sparsiuscule appresso-setosa pilis gracilibus 1.5-2 mm longis, 5(-7)-nervata. Flores 4-meri in foliorum superiorum axillis solitarii, pedicellis infra bracteolas 0.4-1 cm longis supra 0.4-0.5 cm, bracteolis 9-11 X 1.1-1.6 mm oblanceatis persistentibus. Hypanthium (ad torum) 7 mm longum sicut calycis lobi extus sparsiuscule laxo-strigosum pilis gracilibus plerumque 1.5-2 mm longis; calycis tubus 0.8 mm altus, lobis 7 X 2.7-2.8 mm anguste oblongis acutis intus glabris. Petala 17.5-18 X 14 mm obovato-elliptica apice obtuso ciliis 0.2-0.3 mm longis

eglandulosus alioqui glabra. Stamina glabra; filamenta 5.5-5.6 mm longa; antherarum thecae 5.8-6 X 0.8-0.9 X 1 mm, poro 0.3 mm diam., connectivi appendice ca. 1 mm longa ca. 0.2 mm bilobulata a thecis ca. 0.5-0.6 mm libera. Stylus 27 X 0.4-0.5 mm glaber ca. 7 mm exsertus; ovarii apex per ca. 3.5 mm dense strigosus pilis eglandulosus usque ad 1.2 mm longis, lobis apicalibus ca. 1 mm longis.

Type Collection: L. Uribe 3847 (holotype US 2370311; isotype COL), collected at "monte Puracé camino hacia la laguna de San Rafael," Depto. Cauca, Colombia, elev. 3000 m, 7 Sep. 1961. "Arbusto de 1-2 metros de altura. Flor con cáliz rojo y corola morada."

Brachyotum rugosum has much more obviously roughened trichomes, shorter and strictly appressed stem pubescence, 2-3-flowered inflorescences, and shorter apically subulate calyx lobes. Brachyotum uribei is also somewhat suggestive of B. campanulare (Bonpl.) Triana, which has smooth hairs, smaller leaves, mostly ternate flowers, and gland-tipped petal cilia. Certainly there are no close Colombian relatives.

MERIANIA PASTAZANA Wurdack, sp. nov.

M. rigidae (Benth.) Triana arcte affinis, foliis proportionaliter longioribus calycibus longioribus ovarii apice circum styli basim minus prolongato differt.

Arbor 6-10 m alta, foliorum subtus glandulis minutis 0.03-0.05 mm longis sparsis caducis exceptis glabra; ramuli primum obtuse sulcato-tetragoni demum teretes, linea interpetiolariter tenerrima evoluta. Petioli 1-2 cm longi; lamina 11-18 X 5.3-9.3 cm, elliptica apice hebeti-acuto vel rotundato basi late acuta vel obtusa, coriacea et integra, subtus sparse puncticulata, 5-nervata nervis secundariis 4-5 mm inter se distantibus nervulis subtus paulo elevato-reticulatis (areolis ca. 1-1.5 mm latis). Panicula 10-25 cm longa (pedunculo 4-9 cm longo incluso) submultiflora; flores 5-meri, pedicellis 7-9 X 1.5 mm, bracteolis 0.5-0.6 mm longis triangularibus crassis deciduis. Hypanthium (ad torum) 5-6 mm longum teres; calyx 4-4.5 mm longus integer, dentibus exterioribus obsoletis. Petala 25-34 X 20-24 mm obovata glabra. Stamina isomorphica glabra; filamenta 12-13 mm longa; antherarum thecae 10-12 X 1.6-2 X 1.5 mm subulatae declinatae, poro 0.4 mm diam. dorsaliter inclinato, cornu basali 3.5-4 mm longo hebeti-acuto, connectivo ad basim dorsaliter paulo (0.2-0.3 mm) per 4.5 mm elevato sed dente ascendenti non evoluto. Stigma non expansum; stylus 16-17 X 1.3-0.6 mm glaber; ovarium 5-loculare, apice paulo lobulato 0.3-0.4 mm circum stylum protracto.

Type Collection: G. Harling, G. Storm, & B. Ström 10198 (holotype US 2584333A; isotype GB), collected at Mera, Prov. Pastaza, Ecuador, 25 May-6 June 1968. "Tree 10 m with stem thickness 10-12 cm and very hard wood. Buds red; corolla salmon red; filaments red; anthers light yellow; stamen appendage violet blue."

Paratypes (both Pastaza, Ecuador): H. Lugo 861 (GB, US),

Río Tigre 4 km from Mera, 20 Mar. 1969. "Corolla clear tomato red."; H. Lugo 821 (GB, US), Colonia Álvarez Niño 6 km from Mera, 19 Mar. 1969. "Corolla tomato red."

Meriania rigida has elliptic-orbicular leaf blades with length/width ratio 1.2-1.5 (rather than 1.8-2.2), rose to red-violet petals which are usually only up to ca. 21 mm long, calyx 2-2.2 mm long above the torus, stamen connectives with a more prominent suggestion of an ascending dorsal appendage (up to 0.9 mm free in Loja collections), and the ovary prolonged around the style base 1.5-1.7 mm. Loja material (Steysmark 54428) of M. rigida shows the acute ovary apex teeth described by Benthams, while Azuay sampling (Maguire & Maguire 61704) has the ovary apex with only bluntly bilobulate teeth as well as only a suggestion of an ascending connective tooth (ca. 0.2 mm free, rather than 0.6-0.9 mm as in the Steysmark collection); however subspecific distinction is not justified until more collections can be studied.

GRAFFENRIEDA SCANDENS (Gleason) Wurdack, comb. nov.

Ptilanthus scandens Gleason, Bull. Torrey Club 72: 472. 1945.

In Cogniaux' generic delimitation, G. scandens would be placed in Calyptrella, but for Ecuadorian floristic convenience, Louis Williams is being followed in combining the genera. In Cuatrecasas 15807 (isotype, US), a calyptrate thin calyx is evident in buds, the dehiscence being slightly (0.2-0.3 mm) above the torus. The dorsal tooth of the anther connective is quite rudimentary in the type, but more evident (0.1-0.15 mm long) in Ecuadorian material (Jativa & Epling 1142, Tobar Donoso, Esmeraldas), which otherwise agrees well with lowland Valle (Colombia) specimens; such a minute appendage is found in other species of Graffenrieda (G. steysmarkii Wurdack, G. micrantha [Gleason] L. Wms.). Costate (but scarcely alate) hypanthia occur in several other species of Graffenrieda. Apparently conspecific with (but perhaps infraspecifically distinguishable from) G. scandens is a population from 1500 m elev. in El Valle, Colombia (Cuatrecasas 23957), with thicker leaf blades and setula-edged hypanthial wings.

LEANDRA SUBOBRUTA Wurdack, sp. nov.

Sect. Tschudya. E descriptione et photicone L. inaequalifoliae (DC.) Cogn. affinis, petiolis longioribus ramulorum pilis densioribus longioribusque.

Frutex vel arbor parva 1-3 m. Ramuli teretes sicut petioli foliorum venae primariae subtus inflorescentia hypanthiaque pilis erectis gracilibus basim versus sparse barbellatis plerumque 0.3-0.5 mm longis dense obsiti pilis glanduliferis sparse intermixtis. Petioli (2.5-)3.5-5.5(-7.5) cm longi; lamina 8-14(-22) X 3.5-7(-11) cm oblongo-ovata, apice anguste hebeti-acuto basi paulo (0.2-0.6 cm) cordata, membranacea et subobscura ciliato-serrulata, supra et subtus modice appresso-setulosa pilis gracilibus laevibus 0.3-0.5 mm longis, 7-nervata, nervis

secundariis 0.4-0.5 cm inter se distantibus nervulis laxè reticulatis areolis 1-1.5 mm latis. Panicula 6-15 X 3-7 cm pauciflora, ramis oppositis vel 4-verticillatis; flores 5-meri sessiles, bracteolis ca. 0.5 mm longis ante anthesim caducis. Hypanthium (ad torum) 3 mm longum; calycis tubus 0.2 mm altus, lobis interioribus 0.5 mm altis ovatis ciliolatis, pilis pro parte glanduliferis, dentibus exterioribus conicis setulosis lobos interiores aequantibus; torus intus dense fimbriato-ciliolatus, pilis 0.2 mm longis plerumque glanduliferis. Petala 0.6 X 0.4-0.5 mm subobruta obtusiuscula, apice eroso 1-3-setuloso setulis 0.1 mm longis glanduliferis, alioqui glabra. Stamina isomorphica glabra; filamenta 2-2.5 mm longa; antherarum thecae 2.7-3 mm longae subulatae uniporosae, connectivo 0.2-0.25 mm prolongato simpliciter articulado non appendiculato. Stigma truncatum non expansum; stylus 4 X 0.35-0.4 mm basim versus sparsissime inconspicueque setulosus in ovarii collum 0.4 mm immersus; ovarium 3-loculare 9/10 superum, apice sparse vel modice setuloso, pilis 0.2 mm longis p. p. glanduliferis.

Type Collection: H. S. Irwin, J. W. Gear, Jr., R. Souza, & R. Reis dos Santos 16125 (holotype US 2530466; isotype NY), collected in gallery forest ca. 160 km north of Xavantina, Serra do Roncador, Mato Grosso, Brazil, elev. 500 m, 27 May 1966.

Paratypes (all Mato Grosso): Irwin, Gear, Souza, & dos Santos 16298, from ca. 86 km north of Xavantina; D. R. Hunt 5757, from the Xavantina-Cachimbo road 85 km from Xavantina; Ratter, de Santos, Souza, & Ferreira R-1429, from ca. 290 km north of Xavantina; Richards 6636 and 6639, Ratter et al R 2099, and Harley 10174, all from near the Royal Society Base Camp, 12° 49' S, 51° 46' W.

The suggested Amazonian relative has sparser cauline and inflorescence pubescence averaging 0.8-1 mm long, petioles only 0.5-1.7 cm long, upper leaf surface hairs tubercle-based, and hypanthial hairs mostly gland-tipped. The other species treated by Cogniaux in Sect. Tschudya all have short (usually only to 2 cm long) petioles. Among the more recently described species, L. purpurea Gleason has longer pubescence throughout and 5-nerved leaves obtuse at the base; L. polyadena Ule has longer pubescence and much more prominent glandular hairs; and L. phelpsiae Gleason has eglandular completely smooth hairs and 5-nerved leaves.

MICONIA IRWINII Wurdack, sp. nov.

A speciebus 233-235 Monographiae Cogniauxii foliis utrinque acutis differt.

Arbor 4-5 m alta, 12-15 cm diam. Ramuli primum paululo compressi mox teretes sicut folia subtus inflorescentia hypanthiaque densissime pilis stellulatis vel pinoideis 0.05-0.15 mm longis latisque induti. Petioli 1-1.8 cm longi; lamina 4-8 X 2-3.5 cm elliptica, apice breviter (0.5-1 cm) gradatimque acuminato, basi late acuta, integra et coriacea, supra primum modice stellulato-puberula mox glabrata et nitidula, trinervata, nervis secundariis 2-3 mm inter se distantibus supra insculptis subtus ob pilos plerumque occultis nervulis non vel vix evolutis.

Panicula 2.5-3.5 X 2.5-3.5 cm submultiflora, ramulis dichasios 3-5-flores plerumque gerentibus; flores 5-meri sessiles, bracteolis non visis evidenter mox caducis. Hypanthium (ad torum) 2 mm altum; calycis tubus 0.5 mm altus, lobis interioribus 0.4 mm altis ovato-rotundatis extus et ad margines modice stellulato-puberulis, dentibus exterioribus parvis non eminentibus; fructuum calyces decidui. Petala minutissime granulosa 3-3.3 X 1.8-2 mm obovato-oblonga, apice rotundato. Stamina isomorphica glabra; filamenta 2.6-2.8 mm longa; antherarum thecae 2-2.1 X 0.4-0.5 X 0.5 mm oblongae, poro magno 0.3 mm diam. ventraliter inclinato, connectivo 0.4-0.6 mm prolongato ventraliter non appendiculato dorsaliter dente truncato vel paulo emarginato 0.25-0.3 X 0.3 mm descendente armato. Stigma paulo expansum 0.6-0.7 mm diam.; stylus 3.5 X 0.4-0.45 mm basim ipsam sicut ovarii apex sparsissime pilis clavatis barbellatis 0.1-0.15 mm longis armatus; ovarium 3-loculare $\frac{1}{2}$ inferum apice excepto glabrum.

Type Collection: H. S. Irwin, R. Souza, & R. Reis dos Santos 9385 (holotype US 2530459; isotype NY), collected on a rocky slope ca. 12 km northwest of Veadeiros on the road to Cavalcante, Chapada dos Veadeiros, Goiás, Brazil, elev. 1200 m, 21 Oct. 1965. "Gnarled tree 4 m X 12 cm, frequent. Corolla and anthers white."

Paratypes (both Goiás, fruiting): Irwin, Grear, Souza, & dos Santos 12781, from 15 km northwest of Veadeiros, elev. 1000 m, 13 Feb. 1966; Harley & Barroso 11386, from Chapada dos Veadeiros, 21 Dec. 1968.

Miconia burchellii Triana, M. stenocardia Cogn. (ex char.), and M. pohliana Cogn. all have 5-7-nerved leaves rounded to cordulate at the base. Miconia weddellii Naud. (ex char.) has leaves basally rounded (but 3-nerved), racemiform panicles (the branchlets usually not dichotomizing), and anther connectives biauriculate ventrally. From the pubescence, M. herpetica DC. with subsecundiflorous inflorescence branchlets should probably be placed in this alliance, and also M. leucocarpa DC. (which may be an earlier name for M. pohliana). I have referred to M. pohliana Eiten 2960 and 3271 (from Mun. Brotas, São Paulo), both of which are conspecific with several collections from the Distrito Federal as well as not distinguishable from Minas Gerais material (Magalhães 160) distributed as M. leucocarpa. In pubescence, M. nambyquarae Hoehne also resembles the above group of species; I have identified (ex char.) Maguire et al 56568 (from west of Vilhena), Irwin & Soderstrom 6566 (from Garapú), and Prance, Silva & Pires 59178 (from Garapú), all fruiting, as this Mato Grosso species.

MICONIA COLLATATA Wurdack, sp. nov.

Sect. Glossocentrum. M. minutiflorae (Bonpl.) DC. affinis, foliorum venis secundariis 3-5 mm inter se distantibus calycis limbo distanter denticulato connectivo magis prolongato differt.

Frutex vel arbor parva 2-10 m. Ramuli teretes sicut foliorum subtus venae primariae inflorescentiaque primum

sparsiuscule stellulato-puberuli demum glabrati. Petioli (0.5-)1-2 cm longi; lamina 7-11 X 3-4 (-6) cm lanceato-oblonga apice gradatim hebeti-acuminato basi plerumque late acuta, fragilis et obscure undulato-serrulata dentibus 3-5 mm inter se distantibus ca. 0.2 mm altis, supra glabra, subtus in superficie sparsissime stellulato-puberula mox glabrata, trinervata nervis secundariis 3-4 mm inter se distantibus subplanis venulis planis laxe reticulatis areolis 0.5-0.7 mm latis. Paniculæ 5-7 cm longae multiflorae, ramis plerumque 4-verticillatis; flores 5-meri, pedicellis 0.7-1.5(-2.5) mm longis, bracteolis 0.2-0.4 mm longis subulatis vel linearibus ad anthesim plerumque caducis ca. 0.1-0.2 mm infra hypanthii basim insertis. Hypanthium (ad torum) 1.1-1.2 X 1.5 mm primum basim versus sparse stellulato-furfuraceum glabratum; calycis tubus 0.3-0.4 mm altus post anthesim ad torum dehiscens, limbo brevissime (0.1 mm) undulato-5-dentato, dentibus exterioribus minutissimis non eminentibus. Petala minutissime granulosa 2.1-2.2 X 1.1-1.3 mm obovato-oblonga, apice rotundato. Stamina paulo dimorphica glabra; filamenta 1.4-2 mm longa; antherarum thecae 0.8-1.1 X 0.3 X 0.35 mm vel 0.6-0.9 X 0.35 X 0.4 mm oblongae vel obovato-oblongae, poro lato 0.3 mm diam. ventraliter inclinato, connectivo 0.5-0.6 vel 0.2 mm prolongato ad basim dente 0.4-0.5 X 0.4-0.6 mm dorsali descendente vel appendice 0.2-0.3 X 0.3-0.5 mm trilobulata ornato. Stigma truncatum non expansum; stylus glaber 3-3.3 X 0.2-0.3 mm; ovarium 3-loculare $\frac{1}{2}$ inferum, apice glabro.

Type Collection: H. S. Irwin, R. Souza, J. W. Grear, & R. Reis dos Santos 17991 (holotype US 2530455; isotype NY), collected in gallery forest bordered by campo, Serra do Caiapo ca. 30 km south of Caiapônia on the road to Jataí, Goiás, Brazil, elev. 950 m, 29 June 1966. "Shrub ca. 2 m tall. Corolla and anthers white."

Paratypes: Brazil: Prance & Silva 59642 (fruiting) and Irwin, Souza, Grear, & dos Santos 17882, both from Serra do Caiapo, Goiás; Hatschbach 7153 (US), from Barra do Tigre, Bocaiuva do Sul, Paraná; Hatschbach 14294 (US), from Fda. Lagôa, Cianorte, Paraná. Paraguay: Hassler 10566 (S) and 11324 (S), both from the Sierra de Amambay; P. Jorgensen 3841 (US), without definite locality. Argentina: H. M. Curran 27 (US), from Puerto Aguirre, Misiones.

In the widespread M. minutiflora, the secondary foliar veins are 1-2 mm apart, the calyx in bud shows distinct rounded lobes 0.1-0.2 mm high, the anther thecae are 3-4 times as long as broad, and the connectives are prolonged about 0.2 mm to the filament insertion (1/5-1/4 the anther length). The numerous other essentially glabrous and visually nondescript species of Sect. Glossocentrum have been scanned for more definite affinities, but all seem to show more divergence than M. minutiflora. Miconia molesta Cogn., from Alto Macahe, Rio de Janeiro, differs (from the description and photograph) at least in the opposite (rather than verticillate) inflorescence branches, the sessile flowers, and the densely furfuraceous

hypanthia. The general vegetative facies of M. collatata is like that of M. lategrenata (DC.) Naud. of Sect. Chaenantha. The Hassler collections of M. collatata are undoubtedly to be found in the undetermined folders of Miconia in other herbaria. It is somewhat disquieting that so widespread a species has not hitherto been described.

MICONIA PISINNIFLORA Wurdack, sp. nov.

Sect. Chaenantha. M. chrysophyllae (Rich.) Urb. affinis, foliis subtus in superficie glabris differt.

Ramuli 3-angulati sicut foliorum venae primariae subtus inflorescentia hypanthiaque densiuscule indumento appresso granuloso-lepidoto induti. Folia ternata; petioli 0.8-1.4 cm longi; lamina anguste oblongo-elliptica apice gradatim (per ca. 2-3 cm) acuminato basi acuta, firme membranacea et integra, 11-15 cm longa, 2.5-4 cm lata, supra glabra, subtus in venis secundariis venulisque sparse granuloso-furfuracea in superficie glabra, breviter (usque ad 0.5 cm) 5-plinervata (pari infra-marginali tenui incluso) nervis secundariis 0.3-0.5 cm inter se distantibus nervulis subtus planis arcte reticulatis areolis ca. 0.2-0.3 mm latis. Panicula 7-12 X 8-10 cm multiflora, ramis primariis plerumque 3-4 in quoque nodo, floribus in ramulis brevibus ultimis 2-4 obscure secundis; flores 5-meri breviter pedicellati (pedicellis 0.2-0.5 mm longis et ca. 0.2 mm infra hypanthium articulatis), bracteolis 0.2-0.4 mm longis linearibus valde caducis. Hypanthium (ad torum) 0.9-1 mm longum; calyx 0.15-0.2 mm longus et paullulo (0.05-0.1 mm) undulatus, dentibus exterioribus minutissimis inframarginalibus. Petala 1.1 X 0.7 mm obovato-oblonga extus minutissime granulosa. Stamina paulo dimorphica glabra; filamenta 1 mm longa; antherarum thecae 0.4 X 0.35 mm vel 0.3 X 0.25 mm suborbiculari-obovatae ventraliter usque ad basin rimosae; connectivum 0.5 mm vel 0.4 mm prolongatum non appendiculatum. Stigma paullulo expansum 0.25 mm diam.; stylus glaber 0.2 mm diam. in ovarii apicem paulo immersus; ovarium 3-loculare et 1/2 inferum, apice conico sparse lepidotopuberulo.

Type Collection: E. Asplund 19591 (holotype US 2441379), collected in forest near Alpayacu, Mera, Prov. Pastaza, Ecuador, elev. ca. 1100 m, 23 Nov. 1955. "Tree about 10 m high; flowers white."

The suggested relative has leaf blades beneath completely covered with lepidote hairs. I had originally identified Asplund 18591 as M. pilgeriana Ule, which has opposite leaves, stellulate hairs, and much laxer leaf vein areoles (ca. 0.5 mm wide). The whorled-leaf species of Sect. Glossocentrum (M. longifolia [Aubl.] DC., M. ternatifolia Triana, M. pastazana Wurdack) all have much laxer leaf veinlets and larger wide-pored (but not rimose) anther thecae.

MICONIA DENTICULATA Naud., Ann. Sci. Nat. ser. 3 Bot. 16: 214. 1851.

Miconia chrysanthera Cogn., Bot. Jahrb. 42: 141. 1908.

The type collection (holotype and isotype, P) of M. denticulata is Bonpland 3451, from Ayavaca, Piura, Peru; an excellent modern match in all ways for the type is the topotypical López, Fabris, Sagastegui, & Aguado 7760 (US). Other recent collections (all at US, often with somewhat larger leaves) include Soukup 4669, Hutchison & Wright 5064 (topotypical for M. chrysanthera), A. Diaz s. n., Sagastegui & Fukushima 5092, and Lopez, Sagastegui, & Suarez 2641 (Otuzco, Libertad), all except the last-listed from Cajamarca, Peru. The Bonpland collection (G-DEL; Macbride Photograph 25947) annotated by Cogniaux as M. denticulata is duplicated by two Paris specimens of Bonpland from Saraguro, Ecuador annotated by Triana as "M. elaeoides Ndn.??"; this material, in young bud and fruit, is well-matched by Dodson & Thien 1335 (US), from the Loja-Zamora road, elev. 2800 m, at anthesis, which is M. theaezans (Bonpl.) Cogn. Recent Colombian specimens which had been identified as M. denticulata are actually of other species.

ALLONEURON HEXAMERUM Wurdack, sp. nov.

A. bullato Wurdack affinis, foliis amplioribus tenuioribus floribus hexameris differt.

Ramuli quadrisulcati sicut petioli foliorum venae primariae subtus inflorescentiaque sparsiuscule vel modice appresso-setosi pilis plerumque 1-1.4 mm longis apicem versus laevibus ad basim paulo expansis et imperspicue papillosis. Petioli (3-)7-11.5 cm longi; lamina (12-)17-24 X (8-)11-14 cm oblongo-ovata apice gradatim vel subabrupte per 1-2 cm acuminato basi truncata vel rotundata, membranacea et obscure serrulata, supra sparse strigulosa pilis plerumque 0.5-0.9 mm longis laevibus, subtus in venis secundariis tertiariisque sparse vel modice setulosa pilis gracilibus laevibus (0.4-)0.8-1.2 mm longis in venulis superficiei glabra, 7(-9)-nervata nervis secundariis plerumque 4-6 mm inter se distantibus nervulis subtus planis dense reticulatis (areolis 0.2-0.3 mm latis). Panicula 10-27 cm longa (pedunculo 3-7 cm longo incluso) multiflora; flores 6-meri haplostemoni sessiles. Hypanthium (ad torum) 3 mm longum sicut calyx extus dense setosum pilis plerumque 1-1.3 mm longis basi expansa (0.2-)0.3-0.35 mm diam. imperspicue papillosa. Calyx primum clausus demum in lobos paucos ca. 2 mm longos subsistentes dehiscens. Petala 4.2 X 1.8-2 mm anguste obovata apice apiculato extus secus costam crassam interdum sparsissime strigulosa alioqui glabra. Stamina isomorphica glabra; filamenta 3 mm longa; antherarum thecae 1.7-1.9 X 0.7 X 0.9 mm poro singulo dorsalter inclinato 0.25 mm diam., appendice dorsali 0.9 X 0.7 mm ovata hebeti. Stigma punctiforme; stylus 4.2 X 0.35-0.2 mm; ovarium 4-loculare omnino inferum apice glabro alis sex 0.3-0.4 mm altis cum hypanthio conjuncto; capsula 4-valvata; semina numerosa, corpore 0.5 X 0.1 mm pyramidato laevi appendice cordiformi 1.3 X 0.05 mm armato.

Type Collection: Kjell von Sneidern 1638 (holotype S), collected "in silva primaeva ad La Costa, ad pag. El Tambo," Depto. Cauca, Colombia, elev. 800 m, 17 Mar. 1938.

Paratype: von Sneider 977 p.p. (S), topotypical, elev. 1200 m.

All previously described species of Alloneuron had considerably smaller flowers with (2-)3-celled ovaries (Phytologia 21: 360-365, 1971); seeds (where known) of the other species are without the long appendage seen in those of A. hexamerum.

ALLONEURON SNEIDERII Wurdack, sp. nov.

A. hexamero Wurdack affinis, foliis plinervatis subtus minus pubescentibus floribus maioribus 8-9-meris distincte pedicellatis differt.

Ramuli sulcato-tetragoni sicut petioli (abaxialiter) densiuscule strigulosi pilis robustis ca. 0.3 X 0.15 mm conicis papillatis. Petioli 5-9 cm longi adaxialiter dense strigulosi pilis gracilibus ca. 1 mm longis; lamina 20-33 X 9-19 cm oblongo-ovata apice gradatim per 2-3 cm acuminato basi obtusa, membranacea et obscure serrulata, supra paulo rugulosa secus venas primarias modice setosa pilis gracillimis 1-2 mm longis secus venulas sparse caduceque gracili-setulosa in superficie sparse strigulosa pilis 0.2-0.5(-0.8) mm longis robustis, subtus in venis primariis sparsiuscule setulosa pilis gracilibus 0.1-0.2 mm longis in venulis superficieque glabra, breviter (1-1.5 cm) 7(-9)-plinervata nervis secundariis tertiariis venulisque ut in A. hexamero. Panicula 11-24 cm longa multiflora, ramis ramulisque densiuscule setulosus pilis 0.5-1 mm longis ad basim robustis; flores 8-9-meri haplostemoni, pedicellis 1.7-3 mm longis sicut hypanthio calyceque modice vel dense setosi pilis plerumque 1-1.5 X 0.15-0.2 mm basim versus papillatis. Hypanthium (ad torum) 5 mm longum; calyx in alabastris 6.3-6.7 mm longus (apice rostrato ca. 0.5-1.3 mm longo incluso) clausus ad anthesim irregulariter dehiscens lobis plusminusve persistentibus. Petala glabra 8.5-9.2 X 4.1-4.5 mm oblongo-obovata apice late acuto et mucronulato. Stamina isomorphica glabra; filamenta 3-3.7 mm longa; antherarum thecae 2.8-3 X 1.3-1.6 X 1.1-1.3 mm poro singulo 0.4-0.5 mm diam. dorsaliter inclinato, appendice dorsali 1-1.7 X 0.4-0.5 mm hebeti-acuta. Stigma truncatum 0.25-0.3 mm diam.; stylus glaber 9 X 0.35-0.2 mm; ovarium 4-5-loculare omnino inferum apice septis 8-9 hypanthio conjuncto.

Type Collection: Kjell von Sneider 906 (holotype S), collected in "silva primaeva, La Costa, ad pag. El Tambo," Depto. Cauca, Colombia, elev. 1800 m, 31 July 1936.

Paratype: von Sneider 977 p.p. (S), topotypical, elev. 1200 m.

The general aspect of the inflorescences in A. sneiderii is like that in Centronia or Graffenrieda.

TOPOBEA ASPLUNDII Wurdack, sp. nov.

Ex deser. T. indutae Markgr. affinis, foliis minoribus ad basim distincte cordatis ovarii apice densissime crispo-setoso differt.

Rami teretes sicut petioli pedicelli bracteae calycis lobique extus modice pilis modice graciliterque barbellatis 3-4 mm longis incurvo-erectis induti. Petioli 0.5-1.5 X 0.15-0.2 cm; lamina (acumine excluso) 9.5-17 X 7.5-11 cm elliptico-ovata apice abrupte per 0.5-1 cm caudato-acuminato basi 0.5-1 cm cordata, firme membranacea et distanter serrulata dentibus patentibus 0.5-1 cm inter se distantibus et ca. 1 mm altis multisetulosis, supra in venis primariis basim versus dense setosa alioqui glabra vel ad basim margines versus sparsissime appresso-setosa, subtus in venis primariis modice incurvo-setosa pilis barbellatis plerumque 1.5-2.5 mm longis in venis secundariis superficieque sparse setulosa pilis ca. 1 mm longis laevibus ad basim ipsam stellulato-lepidoto-expansis, 5-nervata (pari inframarginali incompleto neglecto) nervis secundariis 4-5 mm inter se distantibus nervulis subtus paulo elevato-reticulatis areolis plerumque 0.6-0.8 mm latis. Flores 6-meri axillares in quaque axilla 2-3 (4-6 per nodum), pedicellis 0.5-0.8(-1.2) cm longis; bracteae liberae 9-10 mm longae 5-7 mm latae oblongo-ovatae acuminatae intus apicem versus sparse strigosae basim versus glabrae appresso-ciliatae. Hypanthium (ad torum) 5 mm longum pilis appressis sparsis apicem versus exceptis glabrum; calycis tubus 1.5 mm longus, lobis lanceatis 5-5.5 X 2.5 mm longe (ca. 3 mm) ciliatis; torus intus densissime pilis gracilibus laevibus ad apicem crispulis ca. 3 mm longis ornatus. Petala ca. 13 X 7 mm obovato-oblonga apice late obtuso vel rotundato apicem versus extus sparsissime caduceque strigulosa et sparse ciliolata alioqui glabra. Antherarum thecae ca. 6 X 1.2 X 1 mm anguste oblongae poris duobus 0.6 mm latis dorsaliter inclinatiss; connectivum dorsaliter ca. 1 mm supra thecarum basim inconspicue tuberculatum. Stigma paullulo expansum ca. 0.3 mm diam.; stylus glaber 0.3-0.1 mm diam.; ovarium 4-loculare et 1/4-1/3 inferum apice libero ovoideo-conico ca. 2.5 mm alto pilis gracillimis laevibus crispulis ca. 2 mm longis densissimis coronato alioqui glabrum.

Type Collection: E. Asplund 10254 (holotype S), collected between Tena and Napo, Prov. Napo, Ecuador, 5 Jan. 1940.

"Epiphyte; shrub with long branches. Petals white. Anthers yellow."

Paratype: Grubb, Lloyd, Pennington, & Whitmore 1586 (NY, US), from "Shinguipino Forest between Rios Napo and Tena 8 km SE of Tena," Prov. Napo, Ecuador, elev. 450 m, 13 Sept. 1960. "Much branched shrub to 2 m."

Topobea induta has 5-plinerved leaf blades up to 25 X 15 cm and with rounded bases, ovate obtuse calyx lobes, petals 8 X 6 mm, and the ovary apex few-setulose. Despite the absence of any recent collections of T. induta, I feel sure, from Markgraf's descriptive comments on pubescence details, of the specific distinctness of T. asplundii. Topobea cutucuensis Wurdack is more distantly related. The paratype of T. asplundii was mentioned in the discussion (Phytologia 24: 208. 1972) of Blakea hirsuta Triana var. rotundata Mgf.; Asplund's flowering collection resolved the generic doubts about the Tena material and

rectified the erroneous identification.

TOPOBEA EPLINGII Wurdack, sp. nov.

T. castaneda Wurdack affinis, foliis subtus non setosis floribus maioribus differt.

Ramuli teretes sicut foliorum subtus venae primariae et secundariae pedicelli bractaeque primum sparse stellulato-pinoideo-furfuracei (pilis 0.05-0.1 mm longis) mox glabrati. Petioli 1.3-3 cm longi; lamina 6-12 X 3-6 cm elliptica apice per 0.5-1.3 cm abrupte caudato-acuminato basi obtusa, integra et tenuiter coriacea, in superficie ubique glabrata, brevissime (0.3-0.5 cm) 5-plinervata (pari inframarginali tenui neglecto) nervis secundariis principalibus plerumque 1.5-2 mm inter se distantibus subtus arcte elevatis. Flores 6-meri in quaque axilla plerumque solitarii, pedicellis 1.5-2 cm longis; bractae hypanthio et calyci ca. 0.6 cm breviores late orbiculares rotundato-truncatae ad margines membranaceae, exteriores 14 X 16 mm ad basim 4-4.5 mm coalitae, interiores 12 X 22 mm liberae imbricatae. Hypanthium (ad torum) 9 mm longum glabrum; calyx 7-7.3 mm altus glaber truncatus (dentibus exterioribus obsoletis) ad margines pellucido-membranaceus. Petala 23-24 X 20-21 mm obovata apicem versus sparse glanduloso-ciliolata (0.05 mm) alioqui glabra. Filamenta (paulo immatura) 7 mm longa glabra; antherae cohaerentes 8.8 X 2 X 2 mm rostratae (rostro ca. 4.5 X 1.2-0.6 mm) poro dorsaliter inclinato 0.7 mm lato, connectivo dorsaliter ad basim inconspicue calcarato (calcaris hebeti-acuto 0.8-1 X 0.2 mm parte libera 0.4-0.6 mm longa). Stigma longe capitatum 3 X 2.6 mm; stylus 17 X 0.5-1 mm glaber in ovarii collum 0.7 mm immersus; ovarium 6-loculare basi 3 mm infera apice conico libero 4 mm alto glabro.

Type Collection: Carlos Jativa & Carl Epling 1123 (holotype US 2639754), collected in tall primary forest at Tobar Donoso (1° 10' N, 78° 31' W), junction of Río San Juan and Río Camumbi, Prov. Esmeraldas, Ecuador, elev. 150 m, 25 July 1966. "Liana; fl pink."

The suggested Colombian relative has similar foliage which however is moderately setulose beneath and smaller (albeit qualitatively similar) flowers (outer bracts only 7 mm long; hypanthium plus calyx 14 mm long; petals 13 mm wide). No other close relatives are obvious. In Cogniaux' monograph, T. eplingii would key to near T. glaberrima Triana, which has much closer secondary leaf veins (0.5-0.7 mm apart), smaller and acute outer bracts, and smaller flowers with somewhat lobed calyx limb and longer (ca. 1.5 mm) dorsal anther calcar.

A NEW SPECIES OF LASIACIS (GRAMINEAE)

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As a result of a study of the genus Lasiacis (Davidse, 1972), one new species has been recognized which in the previous treatment of the genus (Hitchcock, 1920) had been included in the widespread Lasiacis sorghoidea (Desv.) Hitchc. & Chase. A full monographic treatment of the genus will soon be published; however, the new species, especially common in Central America and southern Mexico, is described at this time so that the name may be validly used in other published accounts.

LASIACIS NIGRA Davidse, sp. nov.

Gramen perenne. Culmi usque ad 8 m longi, arcuti, scandentes. Foliorum vaginæ pilosae variantes ad glabras; colla pilosa, puberula vel glabra; ligulae 0.5-1.3(-2.0) mm longae; laminae lineares vel lanceolatae, 5-11(-15) cm longae, (0.3-)0.6-1.8(-2.6) cm latae, plerumque pilosae vel puberulae vel glabrae. Paniculae (2-)5-12(-19) cm longae; rami longissimi 1-8(-11) cm; rami ascendentes vel divergentes ferentes spiculas paucas pedicellis longis; pedicelli patentes ad maturitatem. Spiculae obovatae, (3.6-)4.0-5.0(-5.5) mm longae. Glumae inferiores (1.6-)2.0-2.7(-3.2) mm longae, 5-13-nerves; glumae superiores 7-13-nerves. Flosculi inferiores staminati vel steriles; lemmata 9-11-nervia; antherae rudimentales vel 2.3-2.7 mm longae. Flosculi superiores 3.8-4.6 mm longi, 2.5-2.9 mm lati; antherae 2.1-2.8 mm longae. Caryopses 2.4-2.7 mm longae, 1.9-2.4 mm latae. Chromosomatum numerus $n=18$.

Type: COSTA RICA. Alajuela: 3 km N of Palmares along the Carretera Interamericana, 800 m, edge of coffee plantation, culms 8 m tall, hanging from trees, 22 Oct 1968, Pohl & Davidse 11272 (Holotype: ISC; isotypes: CR, EAP, K, MO, US).

Lasiacis nigra is a montane species primarily found along forest edges, in roadside thickets and among similar secondary woody vegetation. Most elevation records are between 900-2300 m. The species extends from Sinaloa, southern Nuevo Leon and Tamaulipas in Mexico south throughout Central America. In northwestern South America, it occurs in an arc from Ecuador through Colombia and into Venezuela.

Lasiacis nigra is a segregate species from the very variable, widespread L. sorghoidea (sensu Hitchcock, 1920). It is more delicate and scandent than L. sorghoidea, has smaller leaves and inflorescences but larger spikelets, and has inflorescences bearing relatively few, large, long-pedicelled spikelets giving them an open appearance. On the other hand, L. sorghoidea typically has large, moderately dense inflorescences with many small spikelets on short pedicels. The most common type of leaf pubescence pattern in L. sorghoidea is one in which the sheaths are papillose-hispid, the collar is densely hispid, the lower blade surface is velutinous, and the upper blade surface is puberulent or hispidulous. This pattern is rarely encountered in L. nigra in which pubescence varies from nearly glabrous to densely pilose.

The specific epithet refers to the shining black color of the mature spikelets of this, as well as all other species of Lasiacis. The importance of this character in fruit dispersal has been discussed by Davidse & Morton (1973).

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PHANTOMS IN THE FLORA OF THE BAHAMAS

William T. Gillis

A phantom is defined by Webster's New International Dictionary (unabridged, second edition) as an illusion, a fallacious appearance, a representation of something in appearance but not in reality. There are a number of such phantoms in the Bahama Flora (Britton and Millspaugh, 1920), described as being part of the flora, but which are not there at all, at least not as separate entities.

Nathaniel Lord Britton recognized diversity in plants in a way somewhat typical of his period. If differences among specimens could be detected, he named the specimens as discrete species. He never used infraspecific categories. He often fell prey to the same plague that has befallen other writers of insular floras, i.e., that of naming plants as distinct species when in fact the populations possess minor variations that differ from island to island. Britton seldom practised this proliferation of names with such fury as in the Rubiaceae. Most of his "species" in the Bahama flora were described from specimens which he did not collect. He was a keen observer, but may be looked upon in retrospect as having named specimens rather than populations. The "species" of Britton and Millspaugh are the phantoms discussed in this paper.

As a step in the revision of the Bahama flora in collaboration with George R. Proctor and Richard A. Howard, the author has examined much of the material available to Britton and Millspaugh when they wrote their flora over 50 years ago, especially type specimens. In addition, he has had the advantage of examining considerably more specimens, both in the field and in herbaria, than were available to Britton and Millspaugh. Additions to the flora have been noted (Gillis, Howard, and Proctor, 1973; Correll, 1973), and names have been updated for a substantial portion of the flora (Gillis, 1974). Now, a closer examination has been made of the so-called endemics within the flora as viewed by Britton and Millspaugh.

Shortly after the original Bahama Flora was completed, Taylor (1921) analyzed the distributions as published in the flora and revealed that 12% of the flora was reported to be endemic, or about 120 species. This figure appears to be exceptionally high. The Bahama flora is essentially one which populated the islands during and since the Pleistocene. There has hardly passed enough time for such a degree of endemism to develop. Furthermore, the islands are surrounded on three sides by nearby land masses which

have contributed most of the fauna and flora of their antecedents: Hispaniola, Cuba, and the southern United States mainland. In addition, there is a dearth of diverse habitat types in a group of islands such as the Bahamas where no point is greater than 210 feet above sea level, where there are no rivers, and where the substrate is virtually all limestone. It appeared to me that those plants labeled "endemic" in the Bahama flora of Britton and Millspaugh could indeed be found in other neighboring floras, probably under earlier names, if one were but to search for them.

I should like to acknowledge with gratitude a generous grant to the Arnold Arboretum of Harvard University by an anonymous donor who has interest in the Bahama Flora. Under terms of the fellowship thus underwritten, I have been able to examine considerable herbarium material at the Arnold Arboretum and Gray Herbaria, and had opportunities to study the classic Britton and Millspaugh specimens at the New York Botanical Garden and the Field Museum of Natural History, as well as examine older material in herbaria in Europe. The curators of these herbaria have been very gracious in allowing me to examine their material so freely. Of special value were the duplicates of Wright and Grisebach specimens at the Gray Herbarium, often representing type collections of earlier names, originally described from Cuba, but also represented in the Bahamas. A portion of the field work was supported by a grant from the National Geographic Society.

As in previous papers, my use of the term "Bahamas" should be construed in its geographical sense to include the Turks and Caicos Islands as well. For ease of reference, this paper will follow the order of species presented in Britton and Millspaugh's Bahama Flora, only Dicotyledons being discussed herein. For brevity, Britton and Millspaugh's Flora is designated by the expression B&M in the text of this paper. The figure in the lefthand margin refers to the page in B&M on which the taxon in question is discussed. Herbarium abbreviations are those of Index Herbariorum (Lanjouw and Stafleu, 1964).

- 132 Torrubia bracei and Torrubia longifolia. The blollies are notoriously variable plants. There appear even to be some differences in vegetative morphology between staminate and pistillate populations. According to the key in B&M, which employs only characters of the anthocarps, it is not possible to determine identity of sterile, staminate, or flowering pistillate material. Moreover, when examining populations in the field or specimens in the herbarium, there appear to be plants whose characters fall between the limits as defined by B&M. As Adams (1972) pointed out, leaf shape differs markedly, even on the same plant. The leaves may be variously oblong to elliptical or obovate, or even sub-

orbicular. The tips may be rounded or emarginate; the bases rounded or cuneate. An examination of individuals in the wild shows that such variation may be contained within a single species. I therefore believe that Torrubia bracei and T. longifolia are not distinguishable. The earliest name available for this species is based on Pisonia discolor Sprengel (1825). If this species is placed in a genus that is segregated from Pisonia on fruits characters, then its name should be Guapira discolor.

Guapira discolor (Sprengel) Little, Phytologia 17: 367. 1968. Basionym: Pisonia discolor Sprengel, Syst. Veget. ed. 16, 2: 168. 1825. Torrubia discolor (Spreng.) Britton, Bull. Torrey Bot. Club 31: 613. 1904. Guapira longifolia (Heimerl in Urban) Little, Phytologia 17: 367. 1968. Torrubia longifolia (Heimerl in Urban) Britton, Bull. Torrey Bot. Club 31: 614. 1904. Pisonia longifolia (Heimerl in Urban) Sarg., Man. Trees North Amer. 314, fig. 251. 1905. Basionym: Pisonia discolor γ longifolia Heimerl in Urban, Bot. Jahrb. 21: 627. 1896. Guapira bracei (Britton) Little, Phytologia 17: 367. 1968. Basionym: Torrubia bracei Britton, Bull. Torrey Bot. Club 31: 614. 1904. Type: New Providence Island, Ft. Montague coastal coppice, Britton and Brace 168 (NY).

- 73 Given a specimen of Caesalpinia (other than Subg. Guilandina) from the Bahamas, one has a difficult choice in deciding whether it might be C. bahamensis or C. reticulata. The former is described by B&M as "prickly throughout; leaflets scarcely reticulated" and the latter as "unarmed or with a few prickles at the base; leaflets strongly reticulated." On the surface, it appears that these are useful characters. But the populations in the field are not so distinct. The type specimen of C. bahamensis in the Lamarck Herbarium at Paris shows only a few weak prickles opposite the leaves. There are populations which show prickles on the stem only far below where most botanists would bother to select a herbarium specimen. Hence, we can see that the presence or absence of prickles is a variable character, variable both as to degree and to position. It does not appear to be consistent enough to use to separate two otherwise identical populations. It is curious that the prickles become less evident in the southern (i.e., drier) sites; one might suppose that these outgrowths might have been interpreted as responses to droughty conditions. The reticulate nature of the leaves is not a constant character, nor one easy to diagnose. These two names are thus treated as synonymous under C. bahamensis Lam.

- 47 Maytenus lucayana Britton. This name is known from only the type collection, which is represented by mere fragmentary material in an envelope on a herbarium sheet. It seems to

be representative of a population of Maytenus buxifolia that has unusually broad leaves. The definitive character of having a cordate leaf base is not consistent within the few scraps representing the type. Unless more of this material can be found and the distinct nature of the plant reaffirmed, it seems best to treat this population as synonymous with M. buxifolia (A. Rich.) Griseb. The type of M. lucayana is at the Field Museum (F-280855), from West End, Grand Bahama Island.

- 199 Erythroxylon reticulatum Northrop. The characters which Britton and Millspaugh used to separate this species from E. areolatum -- those of longer pedicels and shorter leaves -- appear to be only a difference in populations. Furthermore, the drupes on the type specimen of E. reticulatum are not mature, and only the field notes of Mrs. Northrop suggest that the fruits are purple-black instead of red. I interpret this name to be only a synonym of Erythroxylum areolatum L., and further that the generic name should be spelled thus.

- 284 Myroxylon ilicifolium (Northrop) Britton. In his examination of Cuban collection by Charles Wright, Grisebach (1860) discussed several species of Xylosma (the conserved name in the Flacourtiaceae for Myroxylon). He described Xylosma infestum and X. buxifolium, both of which are represented by isotypes at GH. Upon thorough examination, I have determined them to be synonymous. There are then two names with the same date (and page) of publication. I have chosen X. buxifolium for the name to be used when these two are united because it has been used more commonly in the West Indies. It compares favorably with the type of X. ilicifolia Northrop, and is of an earlier publication date. It is likely that Britton and Millspaugh overlooked a paper by Urban (1893) in which this species (X. buxifolium) is attributed to the Bahamas.

Xylosma buxifolium Gray ex Griseb., Mem. Amer. Acad. n. ser. 8: 155. 1860. Holotype: Cuba, Wright 1465 (GH).

Xylosma infestum Griseb., Mem. Amer. Acad., n. ser. 8: 155. 1860. Isotype: Cuba, Wright 1109 (GH).

Xylosma ilicifolia Northrop, Mem. Torrey Bot. Club 12: 51. 1902. Myroxylon ilicifolium (Northrop) Britton, Bull. N. Y. Bot. Gard. 4: 141. 1906. Type: Andros, Nichols Town, Northrop and Northrop 388 (Holotype: NY; isotypes: A, GH).

- 342 The eight species of Metastelma listed for the Bahamas by Britton and Millspaugh may be reduced to five, but there is one additional species found by Howard (1950) on Bimini and represented in herbaria by an earlier collection from South

Andros. Furthermore, as mentioned by Gillis (1974), the generic name Metastelma in the West Indies is changed to Cynanchum.

At the first point in the key to species of Metastelma, B&M separate M. northropiae from all others by its having a long-stipitate gynostegium. It is clear, upon careful examination, that their M. bahamense also has a long-stipitate gynostegium. These two taxa appear to be synonymous, and they are hereby united under the earlier epithet, bahamense. A new combination in Cynanchum is indicated for this plant of Florida, Cuba, and the Bahamas:

Cynanchum bahamense (Griseb.) Gillis, comb. nov.

Basionym: Metastelma bahamense Griseb., Cat. Pl. Cub.

174. 1866. Epicion bahamense (Griseb.) Small, Fl.

Miami 149, 200. 1912. Type: Not found.

Metastelma northropiae Schltr. in Urban, Symb. Antil.

5: 468. 1908. Cynanchum northropiae (Schltr. in Urban)

Alain. Mem. Soc. Cub. Hist. Nat. 22: 118. 1955. Type:

Andros, Conch Sound, Northrop and Northrop 410 (NY).

Alain (1955) already determined that Metastelma linearifolium A. Rich. in Sagra could not be transferred to Cynanchum because the epithet was preoccupied in Cynanchum. Hence, he published a new name, C. savannarum. I have determined that this action was unnecessary because these plants are identical to C. blodgettii of the southern United States, and this name was available at the time. Moreover, I believe that the populations described as M. barbatum in the Bahama Flora also represent this species. Hence the following synonymy:

Cynanchum blodgettii (Gray) Shinnars, Sida 1: 365. 1964.

Basionym: Metastelma blodgettii Gray, Proc. Amer. Acad.

12: 73. 1877. Type: Blodgett, s.n., Big Pine Key, Florida (GH).

Metastelma linearifolium A. Rich. in Sagra, Hist. Cub.

11: 96. 1850. Amphistelma linearifolium (A. Rich. in

Sagra) Griseb., Cat. Pl. Cub. 175. 1866. non Cynanchum

linearifolium Hemsl., J. Linn. Soc. 26: 107. 1889

(China). Lectotype: Paris. New name: Cynanchum

savannarum Alain, Mem. Soc. Cub. Hist. Nat. 22: 119.

1955.

Metastelma barbatum Northrop, Mem. Torrey Bot. Club 12:

58. 1902. Type: Andros, Red Bays, Northrop and Northrop

474. Holotype, NY; isotype, GH.

Alain recognized that Metastelma hamatum Griseb. could not

be transferred directly to Cynanchum because the epithet was preoccupied in that genus, so he published C. caribaeum as the new name. Having studied these species in the Bahamas very carefully, I have come to the conclusion that C. inaguense is identical with C. caribaeum, and it is not endemic to the Bahamas after all. The new name by Alain was therefore not necessary inasmuch as the basionym Metastelma inaguense Vail was available. The new synonymy follows:

Cynanchum inaguense (Vail) Howard & Dunbar, *Rhodora* 66: 13. 1964. Basionym: Metastelma inaguense Vail, *Bull. N.Y. Bot. Gard.* 4: 142. 1906. Type: Inagua, Nash and Taylor 913 (NY).

Metastelma hamatum Griseb., *Cat. Pl. Cub.* 173. 1866. non Cynanchum hamatum D. Dietr., *Syn. Pl.* 2: 906. 1840. New name: Cynanchum caribaeum Alain, *Mem. Cub. Hist. Nat.* 22: 119. 1955. Type: Cuba, Wright 2959. Isotypes: GH, NY.

Because of the large number of name changes and the addition of an additional species to the Bahama Cynancha, I feel that a new key would be useful. (C. graminifolium, reported by Howard [1950] as M. graminifolium, has been determined to be C. scoparium, a probable introduction from Florida to Bimini and South Andros.)

KEY TO BAHAMIAN SPECIES OF CYNANCHUM

1. Leaves ovate with mucronate tips; gynostegium stipitate
.....Cynanchum bahamense (Griseb.) Gillis
1. Leaves linear, narrowly oblanceolate, spatulate, or
absent; gynostegium sessile or subsessile.....2.
2. Corolla lobes glabrous within; inflorescence a true
umbel.....3.
3. Flowers up to 6 mm. long; calyx lobes lanceolate,
acute; follicles 6-8 cm. long; leaves sessile
.....Cynanchum angustifolium Pers.
3. Flowers 1.5 - 2.5 mm. long; calyx lobes
triangular-ovate, obtuse; follicles 3.5 - 5 cm.
long; plant frequently leafless; leaves, when
present, petioled....Cynanchum scoparium Nutt.
2. Corolla lobes pubescent within; inflorescence not a
umbel.....4.
4. Flowers borne singly, petals recurved and twisted
like a pinwheel; leaves on short shoots.....
Cynanchum eggersii (Schltr. in Urban) Alain.

4. Inflorescence a compressed raceme on a short shoot; petals straight or recurved, but not twisted like a pinwheel; leaves borne on main axis.....5.
5. Petals papillose at tip with tufts of villous hairs within from tip to 0.5 mm. below tip; leaves linear; fruits less than 3.5 cm. long.....Cynanchum blodgettii (Gray) Shinnars.
5. Petals papillose entire length of lobe or with wedge free from hairs in center of inner surface; leaves lanceolate, oblanceolate, or spatulate; fruit longer than 3.5 cm.....Cynanchum inaguense (Vail) Howard & Dunbar.

346 In mapping collections of Evolvulus squamosus and E. bahamensis, I noted that the former did not occur south of the Crooked Island Passage, i.e., off the Great Bahama Bank. Furthermore, the latter, as interpreted by the key and description in B&M and the type collections, seemed to occur chiefly south of this Passage. Moreover, neither appeared to occur on the same island. The diagnostic features which distinguished these two taxa were the length of the leaves: scale-like or short-linear in the first, and linear, 6 - 15 mm. in the second. Upon close examination, it may be seen that there is a cline in leaf length, ranging from very short and scale-like in the northwestern portion of the archipelago, increasing in length to the southeast. With this interpretation, there seems to be but one species of woody Evolvulus in the West Indies. The leaf-length increases toward the south of the Great Bahama Bank and is still greater on Long Island and Rum Cay. The leaf length increases to distinctly non-scalar from Crooked Island southward. Moreover, this trend seems to continue onto Hispaniola; there, the species is known as E. arbuscula.

Van Oostrstroom (1934), in his monograph of Evolvulus, recognized three species in this group. For the most part, the characters he chose as definitive were considerably overlapping. His key in leading to E. squamosus, indicated that the ovary is "densely hairy, seldom almost or quite glabrous." In the description of the species, however, he stated "capsule globular, hairy at the top or glabrous...." The problems of separation become compounded with additional collections. As with other plants in our flora, there is greater variation within the Greater Antilles than there is for the same species within the Bahamian Archipelago. Such a pattern should not be surprising if a single biotype or a small group of biotypes resulted from one to few introduc-

tions to the Bahamas from the Greater Antilles. Hence, I interpret the Bahama populations of woody Evolvulus as Evolvulus arbusculus Poir. in Lam.

- 359 Britton and Millspaugh distinguish their Varronia (Cordia) brittonii from Varronia (Cordia) lucayana on the shape of the leaf: whether the leaves are linear-oblong to oblanceolate or spatulate-obovate! A second character of presence of pilose pubescence at the base of the filaments is also used as a distinguishing character. Again, as in Evolvulus, as one discovers in mapping distributions of specimens (using names assigned to the collections by B&M), Cordia brittonii appears in the northern islands, and C. lucayana in the southern ones. However, if one were given a specimen with no provenance indicated, it would not be possible to determine which species it is, given the information in B&M or the type specimens! I believe they are indistinguishable, and hereby unite them under Cordia brittonii (Millsp.) Macbride. They are names of the same date of publication, but the name C. brittonii has been used for plants in Cuba, so it has the greater scope of use. The pubescence on the filaments is not a reliable character.

- 363 The Heliotropium species also appear to be overdescribed. Heliotropium eggersii is known only from the type collection and is interpreted as only an insular form of H. procumbens (the earlier name for H. inundatum of B&M). Heliotropium nanum is surely no different from H. inaguense, but merely the upper, northwestern form of the plant. The earlier name is H. nanum Northrop. The other Heliotropia are under study by Mr. Michael Frohlich so that further disposition of the taxa in the Bahamas will await his conclusions.

- 384 When Mr. Proctor and I discovered and anomalous Solanum population on Inagua (Gillis and Proctor 12148), we thought we might have a new species. The population turned out to be S. microphyllum which we thought would thus be the first report of this species from the Bahamas. Then, I examined the type of S. didymacanthum which Millspaugh described from Exuma and Cat Islands. These names are determined to be synonymous. The older name to be used for the Bahama populations therefore must be Solanum microphyllum (Lam.) Dunal.

- 411 Britton and Millspaugh had trouble interpreting variation in the Rubiaceae, and consequently produced more phantom species in this family than elsewhere. One example of this difficulty is represented in Catesbaea. Their key separating C. parviflora and C. foliosa demonstrates so much overlap that the two cannot be determined. An examination of populations in the field shows the extent of this

variability such that C. foliosa and C. parviflora var. septentrionalis are merely extremes in the variation of leaf size and shape. The plant represented by the types of C. fasciculata and C. parvifolia is another. Hence, I should like to amend my consideration of the name of the Bahama plant (Gillis, 1974) by the following:

- Catesbaea parviflora Swartz, Prodr. 30. 1788. Type: S.
Catesbaea campanulata Sagra ex DC. Prodr. 4: 401. 1830.
Catesbaea parviflora var. septentrionalis Krug & Urban,
 Symb. An. 1: 429. 1899. Lectotype: Florida, Bahia
 Honda Key, Curtiss 1130 (GH); isotype: GH.
Catesbaea fasciculata Northrop, Mem. Torrey Bot. Club
 12: 66. 1902. Type: Fresh Creek, Andros, Northrop and
Northrop 627 (Lectotype: F-130711; Isotypes: A, GH,
 NY).
Catesbaea foliosa Millsp., Field Mus. Publ. Bot. ser.
 2: 312. 1909. Holotype: West Caicos, Wilson 7761 (F-
 221880).

413 Another genus which B&M tended to overdescribe was Guettarda. This genus was included in the unfinished treatment of Rubiaceae for North American Flora by Standley (1918-34), who simply accepted Britton's species uncritically. Earlier (Gillis, 1974), I united two species (G. taylori and G. inaguensis) under G. nashii. Since that time, I have again studied these populations from Inagua in the field, and have re-examined the types and isotypes. I have concluded that all of these names represent variations in Guettarda krugii. In this case, I am convinced that B&M named specimens and not populations. It is interesting to note that neither Britton nor Millspaugh ever saw these populations in the field, inasmuch as neither ever visited Inagua, the type localities of their three species. The types in question are at New York with isotypes at the Field Museum.

422 Another overdescribed genus of Rubiaceae for the Bahamas is Borreria. As with Guettarda, B&M tended to overdescribe species when they had not seen the populations in the field themselves. With the exception of the type for Borreria brittonii (later name for B. saxicola Britton which is a later homonym) which Millspaugh collected, the types of their proliferated species were collected by Percy Wilson or George Nash and Norman Taylor. I believe that woody Borreria species in the Bahamas should all be recognized as B. thymifolia Griseb. The various characters used in distinguishing features to separate species in B&M are all variable, not only within populations, but even on the type specimens of these "distinctive" plants themselves!

For example, the leaf size of B. wilsonii is intermediate

between that of B. inaguensis and B. bahamensis. The "long-ciliate" calyx of B. wilsonii is represented on the type by 7 - 10 hairs between the lobes of the calyx, none of which is more than 0.5 mm. long, and they are not present on all calices. The ciliate nature of the leaves tends to increase, as does stem pubescence, with degree of droughty climate in the southern portion of the island chain. I have collected two adjacent populations of Borreria on Salt Cay (Turks) that superficially appeared to be distinct; one had bronze leaves; the other had dark green leaves. When they were pressed and dried, the two populations were indistinguishable.

The only species which one may argue is different might be B. savannarum, with its thin leaves, 1-3 cm. long (on herbarium sheets, they give the specimen a superficial resemblance to Najas guadalupensis). I would have continued to recognize this as a distinct species except for the fact that specimens available to me have shown all stages of intermediate leaf length on Inagua alone. Hence, it appears to make the most sense to unite all of the woody Borreria species in the Bahamas under B. thymifolia Griseb.

Borreria thymifolia Griseb., F. Brit. W. Ind. Is. 350. 1864. Type: Turks Island, Hjalmarsson, s.n. (K).

Borreria inaguensis Britton in Britton et Millspaugh, Bahama Flora, p. 422. 1920. Type: Little Inagua, Nash and Taylor 1224 (erroneously given in Bahama Flora as 2124). Holotype: NY; isotypes: F-185973, F-479093).

Borreria brittonii Standley, Publ. Field Mus. Nat. Hist. Bot. ser. 8: 388. 1931. New name for Borreria saxicola Britton in Britton et Millspaugh, Bahama Flora, p. 422. 1920. non Borreria saxicola K. Schum., Bot. Jahrb. 28: 112. 1901 (Trop. Afr.). Type: South Caicos, Millspaugh and Millspaugh 9242. Holotype: NY; isotype: F-278999.

Borreria wilsonii Britton in Britton and Millspaugh, Bahama Flora, p. 423. 1920. Type: Castle Island, Wilson 7787 (Holotype: NY; isotypes: F-221907, GH).

Borreria bahamensis Britton in Britton and Millspaugh, Bahama Flora, p. 423. 1920. Type: Crooked Island, Brace 4749. (Holotype: NY; isotype: F-199831).

Borreria savannarum Britton in Britton and Millspaugh, Bahama Flora, p. 423. 1920. Type: Inagua, Nash and Taylor 1320. Holotype: NY.

- 441 Two aster species of the Bahamas are restricted to the northwestern portion of the islands, which suggests their introduction from the United States. These two "endemic" species appear to be extensions of the ranges of two U.S. instead of being Bahamian endemics, or even, in the case of Aster bahamensis, a species which is endemic to the Bahamas and Cuba. Aster lucayanus is really contained within Aster

concolor L. which extends from Florida to Louisiana and north to New England. The Bahamas are merely the southernmost extension of its range. Our variety is probably var. concolor.

Aster bahamensis matches Aster subulatus Michx., and is best matched with var. euroaster Fern. et Griscom. This is the coastal plain population which extends from Florida west to Louisiana and north to upstate New York. The Bahamas are merely a bridge in its distribution between the mainland and Cuban populations, easily understood when one realizes that, at low water level during the Pleistocene, the Great Bahama Bank was nearer the U.S. mainland by several miles, and only a mere 20 miles or so from Cuba.

447 Tetranthus bahamensis Britton was described as a Bahama endemic. There is, however, no doubt that it represents a northern population of the Cuban species, T. litoralis Sw. Although the only distinguishing feature between most Cuban species and the Bahamian ones is that the Cuban populations usually have larger leaves, there are collections from Cuba which are indistinguishable from those of the Bahamas.

451 The rong-bush, Wedelia bahamensis, was described as an endemic to the Bahamas, occurring more abundantly in the southern islands than the far northwestern ones. It is the same as populations in Cuba and Hispaniola of W. calycina, although more uniform than populations in the Greater Antilles. The complex synonymy has been listed in Schulz (1911) but he chose an illegitimate name as the correct one. Hence, a shortened synonymy of relevant names is perhaps in order:

Wedelia calycina L.C. Rich. in Persoon, Syn. Pl. 2: 490. 1807.

Wedelia jacquinii L.C. Rich. in Persoon, Syn. Pl. 2: 490. 1807 (nomen illeg., pro syn.).

Wedelia buphthalmoides Griseb., Fl. Brit. W. Ind. Is. p. 372. 1864. Type: Bahamas, Swainson, s.n. (K).

Anomostephium buphthalmoides DC., Prod. 5: 560. 1836. Type: G.

Seruneum buphthalmoides (DC.) Kuntze., Rev. Gen. Pl. 1: 365. 1891.

Stemmodontia buphthalmoides (DC.) Cook and Collins, Contr. U.S. Nat. Herb. 8: 244. 1903.

Wedelia bahamensis (Britton) O.E. Schulz in Urban, Symb. Antil. 7: 106. 1911. Basionym: Stemmodontia bahamensis Britton, Bull. N.Y. Bot. Gar. 4: 126. 1905. Type: New

Providence, coastal thicket, Britton and Brace 302.
Holotype: NY.

SUMMARY: Twenty-eight names in the Bahama Flora have been reduced to species present in Cuba, Hispaniola, and Florida. These species were considered to be endemics to the Bahamas by Britton and Millspaugh (1920).

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BOOK REVIEWS

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"AIR POLLUTION AND LICHENS" edited by B. W. Ferry, M. S. Baddeley & D. L. Hawksworth, x & 389 pp., illus., University of Toronto Press, Toronto 181, Ontario, Canada & Buffalo, New York 14203. 1973. \$16.50.

This book comes from a timely symposium of the First International Mycological Congress at Exeter, England, in September 1971. These sturdy slow-growing plants which manage to live even under the apparently harshest conditions and sometimes manage to attain an age of 4500 years (p. 3) have finally met their match in SO_2 . Now they can serve a noxious or toxic warning role for man, his still growing lumber, and his stone and concrete works as did and do canaries in mines! Now there are even more toxic-tolerant ones, as, for instance, Lecanora conizaeoides, a relative newcomer to British urban areas.

Even though most of the field and laboratory investigations — carefully reported in seventeen papers — are centered within the British Isles, the problems are found in many parts of this modern world.

Many different kinds of botanically aware scientists will promptly appreciate the considerable value of the papers in this book and their bibliographies. Folks not so trained, but seriously interested in urban improvement, such as factory engineers, public minded citizens, etc., now have an invaluable source of help in this book.

"ROBERT LESLIE USINGER: AUTOBIOGRAPHY OF AN ENTOMOLOGIST" edited by E. G. Linsley & J. L. Gressitt, xiii & 330 pp., illus., Pacific Coast Entomological Society, California Academy of Sciences, San Francisco, California 94118. 1972. \$15.00.

Published as Volume 4 of the Memoirs of the Pacific Coast Entomological Society by the H. C. Fall Memorial Publication Fund from edited transcriptions of tapes based on his 58 field books as the guide and planned mainly for his family and as a means of passing the time during months of terminal cancer, Usinger here reminisces interestingly and gratefully on "the best of all possible lives". While he fell short of the Biblical "three score and ten" by ten and five, he lived so fully and so usefully as a keenly intelligent and honest person, an admired and loving family man, an inspiring teacher and writer, a world-traveled and world-renowned entomologist interested primarily in systematics, dipteran disease vectors, and cimicid, reduviid and lygaeid bugs, that one is left awed in admiration.

There are appended Usinger's bibliography and a list of scientific names published by him (both prepared by P. D. Ashlock) and a list of some genera and species named for him (prepared by W. C. Gagne). Unfortunately, a few plant and geographical names are misspelled, as, for instance, Cyperus, Sesuvium, Clerodendrum, Boerhaavia, Purshia, and Cali in Colombia.

To read this book, with its fine photographs, is a very nostalgic experience for those who knew him and should be an inspiration for the younger life scientists of today.

"STABILITY AND COMPLEXITY IN MODEL ECOSYSTEMS" by Robert M. May, lx & 235 pp., illus., Princeton University Press, Princeton, New Jersey 08540. 1973. \$4.95 paperbound & \$11.50 cloth-bound.

This is the sixth book in the Monographs in Population Biology Series edited by Robert H. MacArthur and originally launched with that wonderful work on the "Theory of Island Biogeography" by the series editor and Edward O. Wilson. The author, whose name and ideas are now well known in the field of theoretical ecology, entered it with a highly skilled training in physics.

A variety of general mathematical "models aimed not at realism in detail, but at providing mathematical metaphors for broad classes of phenomena" are surveyed to show "the different relationships between stability in randomly fluctuating environments as opposed to deterministic ones, between stability versus complexity in multispecies models and also with few species models in such limited cycles as vegetation - herbivore - carnivore, and between niche overlaps and limiting similarity which has a weak logarithmic dependence on the degree of environmental variance."

The final chapter, "Speculations", has very interesting material that is best transmitted by individual readings and an important warning: "until such time as we better understand the principles which govern natural associations of plants and animals, we would do well to preserve large chunks of pristine ecosystems. They are unique laboratories."

This important and valuable book is primarily directed "at the field and laboratory ecologist, and the text is [too] hopefully accessible to people with minimal mathematical training."

"SWAMPS, RIVER BOTTOMS AND CANNIBALS" by Brooke Meanley, 142 pp., illus., Barre Publishing Co., Barre, Massachusetts 01005. 1972. \$12.50.

This is a delightful, popularly oriented book presenting with interesting descriptive text and over 100 fine photographs - often the work of the author himself - an accurate picture of these wetlands along our southern Atlantic Coastal Plain. The author has studied these areas for 30 years as a U. S. D. I. biologist.

The following places, with their plant and animal life, are portrayed very well ecologically: Okefenokee, Great Dismal Swamp, Altamaha, Ocmulgee canebrakes, White River Wilderness, I'on Swamp, Pinetown Pocosin, Dudley's Hammock, Edisto, Reelfoot, Tensas, Slovak Thicket, Arkansas Great Pecan Forest, Everglades, Big Cypress, etc.

There is a well selected bibliography including notes referring to the specific swamps. There are separate indexes to the plants and animals mentioned in the text giving common and scientific names and page references. Here, unfortunately, the name "mangrove" is equated with Rhizophora mangle exclusively when it actually refers to at least three species of which the one mentioned is merely the dominant and most numerous in the area considered.

"THE TREES OF SOUTH FLORIDA -- Volume I -- The Natural Environments and Their Succession" by Frank C. Craighead Sr., xvi & 212 pp., illus., University of Miami Press, Coral Gables, Florida 33134. 1971 (second printing 1972). \$5.95.

The subtropical and southernmost counties of Florida - Dade, Collier and Monroe - and their numerous offshore islands have been long and well studied and are herein well described by the skillfully trained and dedicated author in each of their following physiographic provinces with their concomitant plant associations: Florida Keys, Florida Bay, Saline Mangrove Zone, Freshwater Swamps, Pineland Ridge, Pineland Sloughs, Tree Island Everglades, Hammocks and Cypress Ridge, and Big Cypress Swamp.

The effects over the years of hurricanes, fires, frost, lightning, alligators, and man with his changing of the water table, his crop growing, his high-rise buildings, and his increasing numbers migrating into the area, are discussed. Over one hundred effective black and white photographs add much to the text which is interestingly and effectively written so as to hold the attention of the trained scientist as well as the general reader of whom there should be many.

"The Everglades National Park can never be restored to its former glories, but much can be saved if we can prevent the destruction of the interior freshwater swamps of this great ecosystem....In the interest of preserving those natural communities that are left, their diverse and in many cases unique characteristics are described in this volume with emphasis on the woody plants as typifying these sites and their changes."

There is a glossary, well selected references including a separate section by John Kunkel Small, an index to common names with their scientific equivalents, and a general index. The black mangrove is, unfortunately, given an invalid name instead of the presently accepted Avicennia germinans; also the matted and tall frogfruits are put in the genus Lippia instead of in Phyla where they belong.

"NUMERICAL TAXONOMY: The Principles and Practice of Numerical Classification" by Peter H. A. Sneath & Robert R. Sokal, xv & 573 pp., illus., W. H. Freeman & Co., Reading, England RG1 3AA & San Francisco, California 94104. 1973. \$19.50.

Much more than just a new edition of "Principles of Numerical Taxonomy" of a decade ago, this is a wholly reorganized and modernized treatment of this relatively new neo-Adansonian field in which the authors are universally considered the initiators and leaders. This "grouping by numerical methods of taxonomic units into taxa on the basis of their character states" has been expedited by and has reciprocally expedited computerization in many fields. The authors limit this treatment to the realm of biological organisms as they did in the previous one.

The text is very carefully organized and thoughtfully presented, stressing its old septalogue, its evidence, resemblance structure, phenetics (vs. phylogeny expressed systematically), identification or discrimination, explained shortcomings and its bigger and better future.

The forthcoming generation of taxonomists and assorted types of biologists with incidental taxonomic concerns often cannot handle the scientific Latin of the older alpha taxonomists because, instead of classical training in Latin and Greek, they have had much more preparation in mathematics, statistics, biophysics, biochemistry, and practical electron data processing. For them particularly this book and the discipline which it discusses should be of special value. There is an extensive bibliography, an appendix of recent biological studies using these methods of numerical taxonomy and a useful index.

"THE DIRECTORY OF PUBLISHING OPPORTUNITIES: A Guide to Academic, Business, Research, Scientific and Technical Publishing Opportunities" 2nd Edition edited by Mary Bucher Roff & Staff, xii & 722 pp., Academic Media, a division of Cordura Corporation, Orange, New Jersey 07050. 1973. \$39.50.

This is indeed a valuable publication of real worth to all college, university, research and technical institution libraries in this country and abroad. This second edition "seeks to assist the writer in finding a suitable opportunity for publication of his manuscript by producing a guide to requirements of 2,490 periodicals" from general to highly specialized and from theoretical to applied in the humanities, social sciences, and physical and natural sciences.

The information is effectively organized, much more legible than many compilations in other fields, and reliable. Curiously, however, there is no entry for the journal - PHYTOLOGIA - in which this present review appears, a journal now in its fourth decade and 28th volume!

"PATTERNS IN PLANT DEVELOPMENT" by Taylor A. Steeves & Ian M. Sussex, xvii & 302 pp., illus., Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632. 1972 [1973]. \$10.95.

This is another worthwhile book in the Foundations of Developmental Biology Series and it is much more than an illustrated series of maturing plant anatomy stages. Limited to the vascular plants, it deals with embryogenesis, shoot apex organogenesis and expansion into leaf and branch, flower and inflorescence, thorn of simple or compound structure, root apex and branching, differentiation of the plant body, secondary growth and vascular cambium, and the cellular basis of organization. "Each cell differentiates in the location where it was formed [unlike animal embryos]. There it is subjected to an environment consisting of other cells, and it becomes both the recipient of regulatory stimuli arising in its surrounding milieu and the source of stimuli that may affect the course of differentiation in other cells."

Evaluation of major relevant experimental studies adds much of value to this book. The authors state wisely that learning to date in this field of phytomorphogenesis is not sufficient yet for any acceptable generalized theory. This treatment is lucidly presented, suitably indexed, and has each chapter provided with a bibliography.

"A DICTIONARY OF USEFUL AND EVERYDAY PLANTS AND THEIR COMMON NAMES" by F. N. Howes, iv & 290 pp., Cambridge University Press, London NW1 2DB & New York, N. Y. 10022. 1974. \$12.50.

This is a gem of a book that should prove ever so helpful to all kinds of botanists, agriculturalists, horticulturists, librarians, etc. because it is carefully and accurately compiled from the 6th edition of "J. C. Willis: A Dictionary of the Flowering Plants and Ferns", which through its current 8th edition (1973) is also carefully and accurately compiled. In the earlier editions of Willis this type of material was included in the text. In the later editions it was omitted and is presented by Howes in a form that will fit handily on the shelf next to the latest Willis. Dr. Howes died last year just before this work was ready to go off to the printers.

Future editions might consider adding to the section on "climbing plants" such common verbenaceous examples as Oxera, Congea, the scandent species of Petrea, Sphenodesme, and Symphorema, to Biblical manna a third kind derived from the algal genus Nostoc, and correcting the scientific names given for Turk's turban to Clerodendrum indicum rather than "spp." because only this species is known by that name (the others are glorybowers), for headache-tree to Premna obtusifolia (P. integrifolia having been ruled invalid), for fiddlewood to Citharexylum and Petitia (since the name is applied to various taxa in those genera), for lemon-scented verbena to Aloysia triphylla [only], and for hatpins to Eriocaulon, Lach-

nocaulon and Syngonanthus (in the United States & Canada). The following corrections need also to be made: Clerodendrum speciosissimum instead of C. fallax, C. kaempferi instead of C. squamatum, C. thomsonae for the misspelled epithet now appearing in the book, and C. philippinum instead of C. fragrans, Gmelina philippensis instead of G. hystrix, Lantana montevidensis instead of L. sellowiana, and Lippia abyssinica instead of L. adoensis. Vervain should be added both to the list of Shakespeare plants and the list of sacred plants. Despite these suggested changes in limited areas -- yes, this is a gem of a book!

"THE SPECIES OF THE BEGONIACEAE" 2nd edition by Fred A. Barkley & Jack Golding, iv & 144 pp., illus., privately published by the authors and the American Begonia Society. 1974. \$5.50 paperbound.

Produced by one of the clear offset copying processes from very neat typing, this list "is not a monograph, and is merely a compendium of published names and published synonymy". The authors' far too modestly chosen "merely" covers a tremendous amount of time, energy, expertise and patience to compile this material from such sources as the Index Kewensis, the Gray Card File, Doorenbos' Check List, etc. which eventually developed into Barkley's Card File of Begonia Names.

This is an alphabetic list of all the species and their varieties so far known to have been published with authorities, sources, dates, geographical origin, subgeneric sections and synonymy. Within the family are included Hillebrandia, with its single species, and Symbegonia, with its ten species, along with the huge and better-known Begonia genus. Because so much material is efficiently collated here, this publication should be a great help to many taxonomic botanists and herbarium curators, to those scientists engaged in any experimental work on the begonias which grow so readily in greenhouses, and to the large group of horticulturists and begonia aficionados. It may be obtained from the second author in Kearny, New Jersey 07032.

"FLORA OF WEST PAKISTAN" edited by E. Nasir & S. I. Ali. "An Annotated Catalogue of the Vascular Plants of West Pakistan and Kashmir" by R. R. Stewart, xviii & 1028 pp. Published under P. L. 480 Research Project of the U. S. D. A. & Agricultural Research Council, Pakistan. 1972.

This full book records results of the author's 60 years of teaching the present and next generation of botanists (including the able editors) and extensive collecting with and without the help of students. He estimates that the flora consists of 128 pteridophyte, 23 gymnosperm, 1140 monocot, and 4492 dicot taxa.

Composites or grasses are considered the most numerous depending upon whether Taraxacum officinalis (misspelled on p. xvii) is counted as a single species or as an aggregate of 88. Legumes with 566 taxa are next in size.

The classification followed seems to be quite conservative. Almost all specimens cited are at Kew or at Gordon College in Rawalpindi. Some common synonymy is given, geographic distribution is indicated, and those invaluable notes and comments that only the field worker with years of experience can share with readers. Also useful are an alphabetic index to genera and species, annotated indexes to authorities and collectors, and a most helpful note on the nature and range of spelling variants for place and personal names. The present tendency is to adopt the English custom of a fixed family name. "When Shankat Ali was collecting for Gordon College many of his plants were ticketed Sh. Ali. He is now S. A. Chaudhary.....more commonly spelled Chaudhri."

With a sincere and intelligent combination of missionary compassion and scientific appraisal and concern the author writes that "Pakistan is facing the problems which are becoming more common in the most crowded parts of the world. There are too many people and there are too many goats, sheep and cattle when the carrying capacity of the land is taken into consideration...Overpopulation is going to lead to a crisis of some sort."

"FLORA OF WEST PAKISTAN" edited by E. Nasir & S. I. Ali, No. 49 "AVICENNIACEAE" by S. M. H. Jafri, 4 pp., illus. Published under P. L. 480 Research Project of the U. S. D. A. & Agricultural Research Council, Pakistan. 1973. Paperbound.

Under the same basic title and editorship as the previously mentioned publication, this one consists of separately treated plant families that are being published as they are readied. Each is provided with the same gridded map showing the districts of West Pakistan. Each is well illustrated. Only the pertinent taxonomic literature is cited for the families, genera and species. Descriptions of these units are clearcut. Specimens examined are cited. At the end there is an index for each family.

Just naturally the smaller families are treated first and the taxonomic interpretation, at least family-wise, tends to be far less conservative than is seen in Stewart's general treatment. This is exemplified in the recognition of the families Monotropaceae, Itaceae, Philadelphaceae, Hydrangeaceae, Corylaceae, Grossulariaceae, Mimosaceae, Molluginaceae, Phrymaceae, Avicenniaceae, etc.

The dominant shrubby tree of the mangrove vegetation on the Karachi and neighboring coastline of the Arabian Sea is here regarded as typical Avicennia marina (Forsk.) Vierh., but in the opinion of H. N. Moldenke it actually represents a variety known as var. acutissima Stapf & Moldenke, the typical form of the species being found on the coasts of Arabia and East Africa. Cer-

tainly it is not the A. alba Blume of R. R. Stewart or the A. officinalis L. of earlier authors.

The list of published families to date includes Flacourtiaceae, Hamamelidaceae, Phytolaccaceae, Oxalidaceae, Ericaceae, Monotropaceae, Frankeniaceae, Polemoniaceae, Iteaceae, Vahliaceae, Averrhoaceae, Thymelaeaceae, Martyniaceae, Juglandaceae, Philadelphaceae, Hydrangeaceae, Meliaceae, Zanichelliaceae, Elatinaceae, Umbelliferae, Linaceae, Corylaceae, Platanaceae, Staphyleaceae, Sphenocleaceae, Burseraceae, Grossulariaceae, Plumbaginaceae, Salvadoraceae, Goodeniaceae, Parnassiaceae, Guttiferae, Pedaliaceae, Capparidaceae, Loranthaceae, Mimosaceae, Datisceae, Moringaceae, Sapindaceae, Molluginaceae, Aizoaceae, Dilleniaceae, Coriariaceae, Cannabaceae, Malpighiaceae, Phrymaceae, Illecebraceae, Juncaginaceae, Avicenniaceae, Alangiaceae, Portulacaceae, Polygalaceae, Dioscoreaceae, Caesalpiniaceae, Brassicaceae, Buddlejaceae, Podophyllaceae, Leonticaceae, Oleaceae, Lardizabalaceae, Papaveraceae, Plantaginaceae, Symplocaceae, Magnoliaceae, Buxaceae, and Passifloraceae, numbered in that order from 1 to 66. Copies of the "Flora of West Pakistan" can be obtained from the Department of Botany, University of Karachi, Karachi, Pakistan, or from the Stewart Herbarium, Gordon College, Rawalpindi, Pakistan.

"A HISTORY OF THE ORCHID" by Merle A. Reinikka, xx & 316 pp., illus., University of Miami Press, Coral Gables, Florida 33124. 1972. \$15.00.

The author, the former editor of "The American Orchid Society Bulletin", had the rich resources of Harvard University's Botanical Museum for reference material. This book is an interesting and valuable crystallization of an encyclopedic array of information.

The first part of the book is devoted to an historical survey of the orchids' introduction from various corners of the world for horticultural, medicinal (as sex determiner and aphrodisiac), spice (as vanilla), and other uses, for the purpose of hybridization (both natural and induced), and for propagation by seed and by meristem sets. It ends with a chronological guide to descriptive and taxonomic orchid literature of well over 300 items extending from the year 1228 for Chao Shih-ken's "Orchid Guide for Kuei-men and Chang-chou" to 1972 for C. A. Luer's "The Native Orchids of Florida".

The second part of the book is devoted to a chronological presentation of 51 major makers of orchid history with condensed yet interesting biographical sketches of persons including Linnaeus, Banks, Brown, Darwin, Warscewicz, Hooker, Reichenbach, Mueller, Veitch, Sander, Rolfe, Schlechter, Ames and Knudson.

The book makes both for relaxing reading to anyone at all interested in nature and for careful study about orchids, orchid collecting and orchidists. It is illustrated by a couple dozen

black/white photographs of orchids and almost 50 portraits of the "makers of orchid history".

"EVERGREEN GARDEN TREES AND SHRUBS" edited by Anthony Huxley, text adapted by Denis Hardwicke & Alan R. Toogood, 181 pp., illus., Macmillan Publishing Co., Inc., New York, N. Y. 10022. 1973. \$4.95.

This is one of the accurate, attractive and useful Macmillan Color Identification Pocket Guides with a hard cover. The text has been condensed selectively from H. G. Hillier's "Manual of Trees and Shrubs" for scientific and common names, habitat, height, cultivated growth form, and cultivation details. Full color plates contain 200 excellently illustrated plants or plant parts.

This book was first printed in Great Britain, but because of the long established custom of exchanging garden plants, it can now be of almost the same value to interested folks with gardens in the United States and any other temperate area.

"DECIDUOUS GARDEN TREES AND SHRUBS" edited by Anthony Huxley, text adapted by Denis Hartwicke & Alan R. Toogood, 216 pp., illus., Macmillan Publishing Co., Inc., New York, N. Y. 10022. 1973. \$4.95.

This is yet another of those fine Macmillan Color Identification Pocket Guides with a hard cover, with the same editor and text adapters of H. G. Hillier's fine work ("Manual of Trees and Shrubs"), and with 302 effectively and accurately colored illustrations of plants or plant parts. There follows alphabetically by scientific name the common name, habitat, height, cultivated growth form and cultivation details, making the book quite usable in temperate zone gardens just about the world over.

In this book, as in the preceding one, background drawings scaled against a house indicate the approximate shape and size to be expected in mature forms. This is an excellent added feature for this series.

"CHENOPODIUM ALBUM ET ESPÈCES AFFINES — Étude Historique et Statistique" by André Beaugé, xx & 447 pp., illus., Société d'Édition d'Enseignement Supérieur, Paris Ve & Centre National de Floristique, Muséum National d'Histoire Naturelle, Paris. 1974. 150 Fr. paperbound.

This carefully prepared study is published as one of the "Documents Pour Une Flore de France" edited by Paul Jovet, with the preface by P. Aellen — world authority on the Chenopodiaceae, the presentation by A. Pons, and the introduction by P. Jovet.

What passes for Chenopodium album (sens. lat.) in most manuals is an almost ubiquitous weedy plant growing in all sorts of different forms in all sorts of different habitats. Consequently it has been observed and argued over by a very large range of taxonomic "splitters" and "lumpers". Perhaps this study may not convert all readers to this newer interpretation, but they will have to take cognizance of all the detailed information skillfully organized between these two book covers for the first time.

The first part of the study is devoted to an historical search with highlights on the pre-Linnaean writers, then on Linnaeus, Haller, Moquin-Tandon, and Aellen. It is illustrated by photographs of some of these workers' herbarium specimens.

The second part is devoted to systematic analysis and taxonomic conclusions. Beaugé examined over a thousand herbarium specimens of this complex, including types. His bibliography is extensive. He made extended field observations and collected over much of Europe and northern Africa. He grew specimens at three different experimental sites. He developed a list of about 130 characters for comparison studies which he presents in detailed comparative charts and electron micrographs of testa ornamentation and micropyle configuration. At Paris and at Marseille are deposited the new types and isotypes of Chenopodium album var. coronatum A. Beaugé, C. album subsp. reticulatum var. coronatum A. Beaugé, and C. ficifolium var. coronatum A. Beaugé.

"INSECTS IN FLIGHT: A Glimpse Behind The Scenes In Biophysical Research" by Werner Nachtigall, translations by Harold Oldroyd, Roger H. Abbott & Marguerite Biederman-Thorson, 153 pp., illus., McGraw-Hill Book Company, New York, N. Y. 10020. 1974. \$13.95 oversize.

The author succeeds in his wish "to convey to the reader something of the joy of discovery that comes to a research worker, as well as the trials and problems.....and my own sense of wonder at the sheer inventiveness of nature.....I hope to have written a book that both the general reader and the student may read with profit, and perhaps [no, assuredly] even other research workers may derive pleasure [and wisdom] from it."

The greatest benefits that flight technologists and related workers "may derive from the study of insect flight are: "the dynamics of propulsion for the development of the helicopter; the art of combining turning and twisting movements for the development of long-range, slow-flying, wing-flapping aircraft; perhaps static theory and constructional ideas.....some con-structural material resembling resilin as an energy accumulator; a retractable contrivance like a set of legs to give a jump start; the thoracic structure of a dragonfly to suggest ideas for cabin construction in light aircraft; and the basic principles of various measuring and monitoring devices."

And such fascinating photographs and text!

"PHYSICS FOR THE LIFE SCIENCES" by Alan H. Cromer, xii & 497 pp., illus., McGraw-Hill Book Company, New York 10020. 1974. \$11.95.

"The purpose of this book is to give students in biology, pharmacy, premedicine, physical therapy, physical education, and the allied health sciences the physics background they need for their professional work." It is not planned for future biophysicists. Bless this author, for he succeeds wonderfully!

Principles are defined directly and simply; examples are often chosen from the human body rather than from some very elaborate mechanical machines; problems are worked out by the use of simple algebra. At the end of the book useful appendices, an annotated bibliography and an index are provided. The topics covered are grouped under mechanics, matter, wave phenomena, electricity, magnetism, and atomic and nuclear physics.

"BACTERIAL AND FUNGAL DISEASES OF PLANTS IN THE TROPICS" by George F. Weber, xvii & 673 pp., illus., University of Florida Press, Gainesville, Florida 32603. 1973. \$22.50.

This excellent book — which should really have had "AND SUB-TROPICS" in its title — is one of the culminating peaks of a half century of phytopathological research at and teaching in the College of Agriculture of the University of Florida by one who has had a near-missionary zeal for training the students sent to him from various tropical and subtropical countries.

It brings "to teachers, students, agricultural agents, extension advisers, growers, crop production managers, farmers and landowners a guide to the identification of plant diseases through the use of diagnostic symptoms and the characteristics of the causal parasite."

For almost 100 of the world's most important warm weather crops arranged alphabetically by common host name from abaca (Musa textilis) to yam (Dioscorea alata) "there is a list of specific diseases and causal agents, followed by a description of symptoms and the essential characteristics and etiology of the parasite. Each section is concluded with a list of references and a list of additional fungi that may be infrequently associated with the host, but nevertheless cause severe damage." Suggestions for prevention and control are general rather than specific for so great a set of variables. There are excellent illustrations, made mostly by the author.

Dispensing copies of this book into the hands of those who want to learn, along with other necessary supportive programs, could prove a great help to our world at this time!

"PHYTOCHEMICAL METHODS: A Guide to Modern Techniques of Plant Analysis" by J. B. Harborne, x & 278 pp., illus., Chapman & Hall Ltd., London ECHP 4EE & Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10016. 1973 [1974]. £ 4.80 or \$15.50.

Despite much recent reported progress in specialized biochemical research usually on animal tissues and products, this book pioneers in phytochemistry, providing a survey to the presently available and most commonly used laboratory methods for the analysis of plant substances and a key to the literature through pertinent bibliographies with each chapter.

The introductory chapter describes the major methods of extraction, isolation, separation and identification. Following chapters treat specifically: phenols with their acids, flavonoid and anthocyanin pigments; terpenoids with essential oils, gibberellins and carotenoids; organic and fatty acids with alkanes and polyacetylenes; such nitrogen compounds as amino acids, amines, cyanogenic glycosides, indoles, cytokinins and chlorophylls; sugars as monosaccharides, oligosaccharides and their alcohol and other derivatives; macromolecules either like the nucleic acids that serve alike in both plant and animal cells or like the lignins and tannins exclusive with the plant world.

This clearly written book is directed to students -- with some biology background -- who may be headed for biochemistry, pharmacognosy, food science, and the obvious field of phytochemistry.

"THE ENCYCLOPEDIA OF CHEMISTRY" 3rd edition, edited by Clifford A. Hampel & Gessner G. Hawley, xviii & 1198 pp., illus., Van Nostrand Reinhold Company, Cincinnati, Toronto, London, Melbourne & New York, N. Y. 10001. 1973. \$27.50.

The original Reinhold Publishing Company's editor's plan for single volumed up-to-date encyclopedias for separate basic sciences continues in this fine source of well explained material, not so erudite that it can be read only by those who don't need to do so nor so simple that an average schoolboy would be tempted to copy topics verbatim for some school report.

The first and second editions of 1956 and 1966 seem to have been favorably received; this third edition should be even more welcome because of the many advances in chemically allied fields and the corresponding increase in the number of students, workers and teachers needing access to such information without too much loss of time in the hunting. Here are over 800 alphabetically arranged and well explained articles by about 600 competent authors. An index guides to subdivision topics within such articles. The editorial staff has done an outstanding job in neat copy, in deletion of outdated information and in avoiding duplication of material under several topics. Pertinent cross-referencing is substituted instead of duplication. A few well selected bibliographic sources are given for each major topic treated.

Biochemists and other biologists running into unfamiliar chemical problems will be fortunate if they are able to reach for this book for at least initial help.

"WYMAN'S GARDENING ENCYCLOPEDIA" by Donald Wyman, xv & 1222 pp., illus., Macmillan Company, London & New York, N. Y. 10022. 1971. \$17.50.

From Abaca (Musa textilis) to the orchid Zygopetalum are listed alphabetically almost 10,000 ornamental and economic plants suitable for temperate zone gardens and greenhouses actually the world around in both northern and southern hemispheres. For each plant scientific and common names, expected height and general description, hardiness zone limits, and place of origin are given. The different kinds of names are each cross-referenced.

There are many excellent drawings and photographs. The latter are mostly the work of the author himself. They are either in black/white and in color in the form of sixteen beautiful plates which show several outstanding garden scenes. Interspersed are such topics as espalier plants, ornamental grasses, hedges, fastigate trees, etc.

"Written by gardeners for gardeners" in this instance includes as main author the outstanding horticulturist emeritus of Harvard's Arnold Arboretum assisted by over a score of other outstanding horticulturists and as recipients of all this valuable and effectively arranged material the many, many thousands of flower-pot and backyard diggers, horticulture students, teachers, and professionals.

"THE BOLETI OF NORTH CAROLINA" by William Chambers Coker & Alma Holland Beers, viii & 96 pp., 66 plates, Facsimile Republication by Dover Publications, Inc., New York, N. Y. 10014. 1974. \$3.50 paperbound.

This is an unabridged copy of what was first published in 1943 by the University of North Carolina as "The Boletaceae of North Carolina". The several black/white and color photographs have been well reproduced.

There have been many scientists and amateurs who have appreciated using this book over the past three decades and finding access to it more and more limited. Since most of these boletes have a wide extra-limital distribution, readers from many areas will be fortunate now to be able to purchase this work so readily and so reasonably. The approach is strictly taxonomic with field references but with no commitments as to edibility.

For the area covered by the title the family consists really only of the many species and varieties of the huge genus Boletus except for a few in Boletinus and Strobilomyces. Unlike some Dover botanical replications, this one has no appendix with up-

dated nomenclature.

"AMERICAN WILD FLOWERS COLORING BOOK" rendered for coloring by Paul E. Kennedy, 48 pp., illus., Dover Publications, Inc., New York, N. Y. 10014. 1971. \$1.25 paperbound.

This is a quasi-original work that may prove a source of enjoyment for wild flower enthusiasts of almost any age providing that they can or have to stay still long enough. The large outlines to be filled in are reasonably well copied mainly from the excellent illustrations in Mary Vaux Walcott's "North American Wild Flowers". The small innards of flowers on many sheets unfortunately are like those of many oldtime commercial coloring books — non-committal as to shape and number. Each coloring plate gives the common and scientific name and geographic location of the depicted plant. But this book's inside and back covers have smaller color photographs that can serve both as inspiration and guide.

"WASPS: An Account of the Biology and Natural History of Solitary and Social Wasps" by J. Philip Spradbery, xvi & 408 pp., illus., University of Washington Press, Seattle, Washington 98105. 1973. \$17.50.

Since the most recent comprehensive study in this field is that of Ormerod of over a century ago and therefore relatively inaccessible, this presentation is both needed and well done. "It aims to provide a detailed account of the ways of wasps such that specialist and naturalist alike can better appreciate the wasps' diverse and remarkable habits.....[and so should] appeal to a wide range of entomologists, ethologists, teachers and research workers" and students.

Even though the excellent geographic distribution maps and some of the text orientation are limited to the British Isles, almost all of this information has value around the world because of the wide distribution of several of the species and their sub-specific taxa and because many of the habits or structures are generic are suprageneric in range. Even color plate XII, "British social wasps", depicts social wasps known over much of the world, such as Dolichovespula norwegica, Vespula rufa, and V. austriaca. There are many excellent original drawings and both black/white and color photographs. These include, along with mostly original charts, anatomical and nest drawings and wonderfully clear color photographs for ethologically "doubting Thomases" such as severing the wing of a fly after its capture, obtaining water prior to pulp-collecting, scavenging on the remains of a crushed snail, and dissecting the abdomen of a bee trapped in a spider's web to obtain the honey-filled crop.

"WILDLIFE AND PLANTS OF THE CASCADES" by Charles Yocom & Vinson Brown, edited by Florence Musgrave, 293 pp., illus., Nature-graph Publishers, Healdsburg, California 95448. 1971. \$3.95 paperbound; also available clothbound.

This constitutes Volume 8 of the American Wildlife Region Series "covering most of the common Wildlife and Plants of the Pacific Northwest and the area of the Lava Beds". The authors are two outstanding naturalists with deserved enduring and far reaching appeal, especially to budding and learning naturalists who combine this study-hobby with hiking, camping, etc. They have provided reams of valuable and accurate natural history for this book. Over 400 scientifically good line drawings and some poorly printed color plates offer further identification help.

If this format were presented to the interested public from 20 to 50 years ago, it would have been more appreciatively received. And why are not plants a part of "wildlife"?

"THE EXPLORATIONS OF CAPTAIN JAMES COOK IN THE PACIFIC AS TOLD BY SELECTIONS OF HIS OWN JOURNALS 1768-1779" edited by A. Grenfell Price, xvii & 292 pp., illus., Facsimile Replication by Dover Publications, Inc., New York, N. Y. 10014. 1971. \$3.50 paperbound.

This text is an unabridged republication of The Limited Editions Club publication in 1957 to which is prefixed a valuable new introduction by Percy G. Adams who claims with ample support gleanable from this book itself, from other similar sources and from recorded history that "the most obvious conclusion is that no man ever did more to alter and to correct the map of the earth....

"The scientific advances effected by some of Cook's supernumeraries, notably Banks and the Forsters, and by the three voyages [1st - H. M. Bark Endeavour, 2nd - H. M. S. Resolution, 3rd - H. M. S. Discovery followed by Resolution] in general are incalculable.. But no previous collection of botanical and zoological lore rivalled the one Cook's scientists turned over to the British Museum". Cook's own journals could not include the biological results of these journeys, but they do make fascinating reading and reveal much of the great man he was, as well as provide accounts of seamanship and new local anthropological observations. The editing comments of Price make for smooth narrative and also good reading.

"WOOD AND WOOD GRAINS: Photographic Album for Artists and Designers" by Phil Brodatz, xiv & 113 pp., illus., Dover Publications, Inc., New York, N. Y. 10014. 1971. \$3.00 paperback.

This original Dover publication offers an inexpensive refreshing artistic excursion for botanists, teachers, foresters, etc. away from humdrum wood section slides [they are humdrum, actually, only because they are usually so regarded] to enjoy a superb "picture collection of textures, surfaces and interesting materials [often, unfortunately, innominate] which show design in its broadest sense."

Patterns in new and old wood in various sections -- idle, in old buildings, fences, cordwood stacks, in bark texture and in nature's sculptured weathered forms -- are revealed quietly and impressively. The last section shows fine photomicrographs of nine different commercial woods, each 10x, 80x and 100x.

"DICTIONARY OF BEHAVIORAL SCIENCE" compiled and edited by Benjamin B. Wolman & Staff Psychologists, ix & 478 pp. Van Nostrand Reinhold Company, Cincinnati, Toronto, London, Melbourne & New York, N. Y. 10001. 1973. \$19.95.

For the very large number of students, young trainees, professionals whose fields skirt or overlap the various areas of psychology, psychopharmacology and psychiatry, and interested reading public a bit beyond the 'sob story analyzer' this dictionary can serve as a reliable source of correctly limited and explained terms not often found in smaller general dictionaries. Cross-referencing saves repetition and not at the expense of accessibility.

"HUMAN" should really be added to the title of this work; it seems to be inferred throughout.

"FLORA OF THE PACIFIC NORTHWEST: An Illustrated Manual" by C. Leo Hitchcock & Arthur Cronquist, xix & 730 pp., illus., University of Washington Press, Seattle, Washington 98105. 1973. \$25.00.

This excellent manual has been distilled from the 5-volume "Vascular Plants of the Pacific Northwest" published from 1955 to 1969 by the same authors and others. The area covered includes the full state of Washington and all adjacent areas. It contains only the more common of synonyms and vernacular names. It is copiously illustrated by shrunken but still accurate line drawings by J. R. Janish taken from the 5-volume work. A few Verbenaceae (e.g. the hybrids Verbena bingenensis and V. perriana, both known from Klickitat County) failed to be mentioned, perhaps because they are hybrids, as the infraspecific taxa are also omitted.

This book will prove of great value in the field and laboratory for amateurs, botanists, students visiting the region, and technicians on some ecological, agrarian, wildlife management or other studies who need to know the names of the plants involved.

"PLANT SCIENCE: An Introduction to World Crops" 2nd Edition by Jules Janick, Robert W. Schery, Frank W. Woods & Vernon W. Ruttan, viii & 740 pp., illus., W. H. Freeman & Company, San Francisco, California 94104. 1974. \$14.50.

Since the first (1969) edition has been highly praised for its orientation and content and since this new edition is virtually unchanged except for the addition of two timely chapters and their new references, this new edition should prove very valuable as the basic text or as supplementary reading for many different courses in allied fields.

"The formal disciplines that have been established in agriculture (agronomy, horticulture, forestry), botany (systematics, physiology, genetics, ecology, etc.) and the social sciences (economics, sociology, political science, history) must be interrelated to provide a full understanding of the relationship between men and plants." Appropriately, the two new chapters are on "Agriculture, Pollution, and the Environment" and "The Organization of Agricultural Research Systems".

On p. 255 Tectona is misspelled. The definition for a pome remains unchanged even after being questioned about it as a "fruit having an inner cartilaginous [a term better not applied in botany] core surrounded by fleshy tissue."

"ETHNOBOTANY OF WESTERN WASHINGTON: The Knowledge and Use of Indigenous Plants by Native Americans", Revised Edition by Erna Gunther, 71 pp., illus., University of Washington Press, Seattle, Washington 98105. 1973. \$5.00 clothbound, \$2.45 paperbound.

The text, arranged systematically by scientific names of under 200 plants, describes their uses as food, drink, medicine and/or magic, clothing and other objects by the 18 Amerind tribes of Western Washington. Since the date of first publication back in 1945 additional research in such cultural anthropology and the growing interest on the part of persons concerned about the interrelationships between man and his environment have made this new revision highly desirable. It has been made both more attractive and more valuable by the addition of about 40 accurate line drawings of some of the mentioned plants by J. R. Janish that had previously been published in the "Vascular Plants of the Pacific Northwest".

"BUTTERFLIES OF THE WORLD" by H. L. Lewis, xvi & 312 pp., illus.,
Follett Publishing Company, Chicago, Illinois 60607. 1973.
\$29.95 oversize.

The 208 plates with almost 7,000 beautiful natural color prints of authenticated specimens from the renowned entomology collection in the British Museum, the introduction, the text and the index all bear testimony to the photographer-author's lifetime lepidopterist studies combined with a military career that permitted his observing and collecting specimens in much of the "British Empire". The plates are grouped in geographical-continental units and then by families within them. The sizes printed are all normal except for reduction in some large forms only. Geographic distribution maps are given on each plate. The text lists for each the scientific name with authority, common name, areas of distribution, terrain, larval food plants, resemblances and differences between sexes, subspecific taxa and similar species. Only the extremely rare and inaccessible are not included. "Because this book is intended to assist in identifying all species, not just to illustrate particularly beautiful or interesting ones, much care and thought have been given not only to the selection of species for illustration but also to whether male or female, upper or lower sides" should be shown.

The price is modest in terms of today's market. The book is a jewel piece of gems attractively and accurately portrayed and described with worldwide scope for scientists, amateur naturalists and beauty appreciators of many kinds. Because of its scope and scholarly preparation it also is an important reference source.

Unfortunately the review copy has pages 290-291 and 294-295 completely blank.

"MOLECULAR BIOLOGY: AN INTRODUCTION TO CHEMICAL GENETICS"

Second Edition by J. M. Barry & E. M. Barry, xiii & 142 pp.,
illus., Concepts of Modern Biology Series, Prentice-Hall,
Inc., Englewood Cliffs, New Jersey 07632. 1973. \$9.95
clothbound, \$4.95 paperbound.

In this new edition, arriving a decade after the first and after entering college students have had some previous exposure to a chemical-molecular operational basis for biological processes, the authors seem to write under less pressure. The explanations seem to be clearer, better limited, and therefore easier to understand not only for details of processes (as bacterial DNA replication) but also for the overall picture (as one gene one protein) and for understanding what may be needed for future directions of research in gene regulation in the development of higher organisms. Yet the level of treatment is more advanced. Good illustrations, bibliography, glossary and index make for efficient use of this book which deserves wide employment in teaching.

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THE CONFUSED SPERMACOCE

William T. Gillis

In the process of preparing a new Bahama flora with George R. Proctor and collaborator Richard A. Howard, I have been concerned with accurate application of scientific names. Numbers of plants whose names in Britton and Millspaugh's flora (1920) were imprecisely applied have already been noted (Gillis, 1974a and 1974b). One particularly perplexing case turned up -- perplexing because it deals with an invalid name for a widespread weed of both New and Old World tropics and sub-tropics. This is the species originally described after a fashion by A. B. Rendle, Spermacoce confusa.

When Rendle (1936) described Spermacoce confusa, he neglected to provide a Latin diagnosis, a required procedure as of 1 January 1935. The binomial, therefore, is invalid and has no standing under the Code. It has, however, been used in a number of floras ever since, those of Barbados (Gooding, Loveless, and Proctor, 1965), Jamaica (Fawcett and Rendle, 1936; Adams, 1972), and Cuba (Alain, 1962), to name a few. Because this species is of concern to a number of flora writers presently at work (for Guatemala, Costa Rica, Tropical East Africa, etc.), it is vital to make this binomial valid. I believe that science is best served by validating Rendle's binomial, rather than proposing a different name at this time. Moreover, it is probably best to adopt his concept. Hence, I have chosen as type a collection that had been examined by Rendle himself. I should like to acknowledge with deep appreciation the advice and counsel to Dr. Bernard Verdcourt, Royal Botanic Gardens, Kew, in choosing a type specimen.

Spermacoce confusa Rendle ex Gillis, sp. nov.

Herba annua, 30 - 90 cm. alta, caule suberecto aut effuso, scabridiusculo in angulis; radice palari verticali; foliis lanceolatis ad lineare-lanceolatis, supra pilosis ad scabridiusculis, subtus scabridiusculis in nervis, subsessilibus, acuminatis, angustatis ad bases, 2.0 - 6.0 cm. longis, 2 - 5 (-10) mm. latis, saepe uninerviis et revolutis; vagina stipulare 1 - 2 mm. lata, ferenti 3 - 5 setas filiformes; floribus 6 - 15 in inflorescentiis arctis axillaribus; tubo calycis 1.5 mm. brevioris quam fructo, excedenti limbum 4-lobum; corolla lavandula basi gemmaeque, aliter alba, 2 mm. longa; lobis corollae ovatis ad 1 mm., minis quam dimidiis longioris quam tubis; staminis insertis ad basem tubi, inclusis intra tubum; capsula subglobosa, 2.5 mm. longa, setosa, coronata lobis persistentibus sepalorum; semine oblongo, rufo-nigro, foveato leviter. Differt a S. ten-

uiore habitu annuo, foliis scabridiusculis, et capsula setosa.

Type: Jamaica, Lower Clarendon Parish, Inverness, 300 feet altitude, in the open in rocky soil. 7 December 1917, William Harris 12749. Holotype: BM; isotypes: F-479011, GH, IJ, NY.

S. tenuior Auct., non L.: Lam. Tab. Encyc. et Méth. 1: 273, t.62, fig. 1. 1791; DC. Prodr. 4: 552. 1830; Griseb. Fl. Brit. W. Ind. Is., p. 349. 1864; Griseb. Cat. Pl. Cub., p. 141. 1866; Hemsl., Biol. Centr. Amer., Cozumel I. Suppl. p. 102. 1887; Hitchc., Missouri Bot. Gard. Rept. 4: 45. 1893; Urban, Symb. Ant. 4: 608. 1911 and 8: 690. 1921; Britton, Fl. Amer. Virgin Is., p. 95. 1918; Britton, Fl. Bermuda, p. 365. 1918; Britton and Millspaugh, Bahama Fl. p. 423. 1920; Freeman and Williams, Fl. Trin. and Tobago 2 (pt. 1), p. 44. 1928; Small, Manual S.E. Fl., p. 1265. 1933.

as S. confusa Rendle, nom. invalid.: Rendle, J. Bot. 74: 12. (Fig. D-F). 1936; Fawcett and Rendle, Fl. Jamaica 7: 120. 1936; Alain, H., Fl. Cuba 5: 140. 1962; Gooding, Loveless, and Proctor, Fl. Barbados, p. 409. 1965; Adams, Fl. Pl. Jamaica, p. 732. 1972.

S. portoricense Balbis, Small, Fl. S.E.U.S. ed. 2: 1117. 1913.

as S. glabra Michx., Fl. S.U.S. ed. 3: 193. 1897.

Annual herb, 30 - 90 cm. high, with a suberect or spreading stem, scabridulus on the angles; with a vertical taproot; leaves lanceolate to linear-lanceolate, pilose to scabridulus above, scabridulus on the veins below, subsessile, acuminate, narrowed at the bases, 2.0 - 6.0 cm. long, 2 - 5 (10) mm. broad, often single-nerved and revolute; the sheathing stipule 1 - 2 mm. broad, bearing 3 - 5 filiform bristles; flowers 6 - 15 in tight, axillary inflorescences; calyx tube 1.5 mm., shorter than the fruit, exceeding the 4-lobed limb; corolla lavender at the base and in bud, otherwise white, 2 mm. long; lobes of the corolla ovate to 1 mm., less than half as long as the tube; stamens inserted at the base of the tube, included within the tube; capsule subglobose, 2.5 mm. long, setose, crowned by persistent lobes of sepals; seed oblong, red-black, lightly pitted. It differs from S. tenuior by its annual habit, scabridulus leaves, and setose capsule.

I should like to acknowledge with appreciation a grant from an anonymous donor to the Arnold Arboretum which enabled me to carry out research on the Bahama flora.

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NEW COMBINATIONS IN THE LICHEN GENUS *PSEUDOPARMELIA* LYNGE*

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The genus *Pseudoparmelia* was described by Lynge (Ark. f. Botanik, 13(13): 15. 1914) on the basis of *P. cyphellata* Lynge. He had found "cyphellae" in a Brazilian specimen, but these were recognized later as scars of broken rhizines (Santesson, R. Sv. Bot. Tidskr. 36: 471-474. 1942). The generic name, however, is nomenclaturally valid and includes all species now recognized in *Parmelia* subgenus *Parmelia* section *Cyclocheila* (Hale, M.E. & S. Kurokawa, Contr. U.S. Nat. Herb. 36: 147. 1964). The genus *Pseudoparmelia* is thus recognized by the presence of simple rhizines and sublinear to irregularly widened, often apically subrotund lobes. Cilia are always absent and the apothecia adnate to substipitate with imperforate discs. The upper cortex consists of palisade plectenchyma with a pored epicortex (Hale, M.E., Smithsonian Contr. Bot. 10: 9. 1973). While still a rather heterogeneous group, it is most closely related to *Xanthoparmelia* in general morphology. In terms of chemical diversity it is second only to *Hypotrachyna* in the family.

At the present time at least 65 species can be recognized in *Pseudoparmelia* and further monographic work will uncover more, especially in Africa. Generally speaking, the genus occurs at lower elevations in dry temperate to subtropical regions with greatest frequency in Africa (Hale, M.E. Bryol. 75: 342-348. 1972).

*This work was supported by a grant from the Smithsonian Research Foundation.

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- Pseudoparmelia pachydactyla* (Hale) Hale, comb. nov. Basionym:
Parmelia pachydactyla Hale, Phytol. 23:345. 1972.
- Pseudoparmelia prolata* (Hale) Hale, comb. nov. Basionym: *Parmelia prolata* Hale, Bryol. 75:344. 1972.
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NOTES ON NEW AND NOTEWORTHY PLANTS. LXXII

Harold N. Moldenke

ASTER SAGITTIFOLIUS f. ALBIFLORUS Moldenke, f. nov.

Haec forma a forma typica speciei corollis radialibus albis recedit.

This form differs from the typical form of the species, *A. sagittifolius* Wedemeyer, in having the ligules of the ray-florets white.

The type of the form was collected by Alma Lance Moldenke and Harold Norman Moldenke (no. 28873) at the edge of woods, Buttzville, Warren County, New Jersey, on September 4, 1974, and is deposited in the Lundell Herbarium at the University of Texas, Dallas, Texas.

PAEPALANTHUS CANESCENS var. ATRATUS Moldenke, var. nov.

Haec varietas a forma typica speciei recedit pubescentibus valde molliterque hirsutis et bracteis involucrantibus atrobrunneis vel nigris.

This variety differs from the typical variety of the species in having the pubescence on stems, leaves, and sheaths softly but conspicuously villous and the involucre bractlets dark-brown or black.

The type of the variety was collected by William Russell Anderson (no. 6636) in sandy soil of a wet campo by a stream in a region of grassy cerrado with *Mimosa* trees, sloping down to cerrado among blocky sandstone, then to mesophytic woods along a stream, 16—17 km. by road north of Alto Paraíso, at an altitude of about 1600 meters, Chapada dos Veadeiros, Goiás, Brazil, on March 8, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey.

PAEPALANTHUS ELONGATUS var. LONGIBRACTEATUS Moldenke, var. nov.

Haec varietas a forma typica speciei bracteis involucrantibus perelongatis 10—13 mm. longis atrobrunneis firmè divaricatis argute attenuatis recedit.

This variety differs from the typical form of the species in having its involucre bracts all greatly elongate, 10—13 mm. long, firmly divaricate in stellate fashion, gradually attenuate to the sharply acute apex, centrally costate, very dark-brown to blackish, lightly puberulent on the back, and more or less white ciliate-barbellate at the apex.

The type of this variety was collected by H. S. Irwin, J. W. Grear, Jr., R. Souza, and R. Reis dos Santos (no. 12374) in a wet meadow, at an altitude of 1000 meters, Chapada dos Veadeiros, about 15 km. west of Veadeiros, Goiás, Brazil, on February 8, 1966, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as caespitose and to 70 cm. tall.

VERBENA MONTICOLA Moldenke, sp. nov.

Herba robusta, ramis ramulisque atrogriseis vel atrobrunneis perspicue tetragonis minute puberulis, angulis acutis, nodis annulatis, internodis regulariter brevibus 1.5—2 cm. longis; foliis decussato-oppositis trifidis sessilibus 1—1.5 cm. longis 4—8 mm. latis, laciniis regulariter 1—1.5 mm. latis utrinque strigillois; inflorescentiis spicatis terminalibus 1.5—4 cm. longis dense multifloris.

Robust subligneous herb; stems, branches, and branchlets dark-gray to dark-brown, conspicuously tetragonal, minutely puberulent, the angles rather sharply acute, the nodes mostly annulate, the internodes even on older parts rather uniformly short, 1.5—2 cm. long; leaves decussate-opposite, sessile, 1—1.5 cm. long, 4—8 mm. wide, deeply trifid at the midpoint, strigillose on both surfaces, the segments (including the basal petiole-like one) uniformly 1—1.5 mm. wide, oblong, 1-veined, the vein impressed above, the terminal segments acute; inflorescence solitary, terminal, or sometimes paired, rather long-pedunculate, very densely many-flowered, 1.5—4 cm. long, spicate; peduncles slender, 2—3 cm. long, whitish-puberulent or pilosulous; bractlets lanceolate, 8—9 mm. long, sharply acute at the apex, mostly decidedly recurved, strigillose especially on the margins; calyx strigillose, about 6 mm. long, the rim 5-apiculate; corolla hypocrateriform, violet, its tube slightly surpassing the calyx.

The type of this species was collected by A. Lopez M. (no. 8079) at the border of a railroad embankment at km. 156, Jalca de la Ramada, Carretera Huamachuco, prov. Huamachuco, La Libertad, Peru, at an altitude of 3500 meters, on December 18, 1973, and is deposited in the Britton Herbarium at the New York Botanical Garden.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XLIX

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional bibliography: J. Hutchinson, *Fam. Flow. Pl.*, ed. 3, 32, 657, 710—712, 916, 920, 923, 930, 939, 940, 944, 949, 951, 956, 957, 962, 964, & 967, fig. 364 & 364a. 1973; Anon., *Biol. Abstr.* 58 (2): B.A.S.I.C. B.12. 1974; Dony, Perring, & Rob, *English Names Wild Fls.* 28 & 101. 1974; Hocking, *Excerpt. Bot. A.* 23: 314. 1974; Moldenke, *Biol. Abstr.* 58: 680. 1974; Moldenke, *Phytologia* 29: 76—113. 1974; A. L. Moldenke, *Phytologia* 29: 171—172. 1974; Rousseau, *Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:]* 120, 382, 470, 480, 493, 509, 550, 625, 705, & 762. 1974.

ERIOCAULON DEPRESSUM R. Br.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 153 & 204. 1949; Moldenke, *Phytologia* 24: 355. 1972.

ERIOCAULON DIANAE Fyson

Additional bibliography: Wangerin in Just, *Bot. Jahresber.* 51 (1): 169 & 170 [135 & 136] (1929) and 50 (1): 232. 1930; Fedde in Just, *Bot. Jahresber.* 51 (2): 295. 1933; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 126, 128, & 204. 1949; Vankatareddi, *Bull. Bot. Surv. India* 12: 220. 1970; Moldenke, *Phytologia* 25: 125 (1973), 26: 23 & 25 (1973), and 28: 444. 1974.

Vankatareddi (1970) describes this species as "Fairly common along stream", flowering from July to November, and cites his nos. 87777, 99009, 99101, 99104, 97923, & 99377 and Gammie 15903. The G. Thomson s.n. [Maisor, Carnatic], cited below, is a mixture with E. truncatum Hamilt.

Additional citations: INDIA: Kerala: Santapau 13286 (E--1624141), 13319 (E--1624128), 13320 (E--1624127), 13321 (E--1624126), 13324 (E--1624123). Mysore: G. Thomson s.n. [Maisor, Carnatic] (Pd).

ERIOCAULON DIANAE var. *LONGIBRACTEATUM* Fyson

Additional bibliography: Wangerin in Just, *Bot. Jahresber.* 51 (1): 169 [135]. 1929; Fedde in Just, *Bot. Jahresber.* 51 (2): 295. 1933; Moldenke, *Geogr. Distrib. Verbenac.*, [ed. 2], 126 & 204. 1949; Moldenke, *Phytologia* 26: 23 & 25. 1973.

ERIOCAULON DIANAE var. *RICHARDIANUM* Fyson

Additional bibliography: Wangerin in Just, *Bot. Jahresber.* 51 (1): 169 [135]. 1929; Fedde in Just, *Bot. Jahresber.* 51 (2): 295. 1933; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 126 & 204. 1949; Moldenke, *Phytologia* 24: 356. 1972.

ERIOCAULON DICLINE Maxim.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 134 & 204. 1949; Moldenke, *Phytologia* 24: 356. 1972.

ERIOCAULON DICTYOPHYLLUM Körn.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 76 & 204. 1949; Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1156, map 1775, & Ind. 12. 1972; Moldenke, *Phytologia* 26: 182. 1973.

Additional citations: BRAZIL: Mato Grosso: Ratter, Santos, Souza, & Ferreira R. 1724 (Ca--1376879, E--2050108).

ERIOCAULON DICTYOPHYLLUM f. *VIVIPARUM* Moldenke

Additional bibliography: Hocking, *Excerpt. Bot. A.* 21: 30. 1972; Moldenke, *Phytologia* 26: 182. 1973.

Additional citations: BRAZIL: Mato Grosso: Santos & Souza R. 1758 (Ca—1376880, E—2050107).

ERIOCAULON DISEPALUM Ridl.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 138 & 204. 1949; Moldenke, Phytologia 26: 182. 1973.

ERIOCAULON DREGEI Hochst.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 502. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 245. 1901; Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 122 & 204. 1949; Moldenke, Phytologia 24: 357 (1972) and 29: 113. 1974.

ERIOCAULON DUTHIEI Hook. f.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 26: 23. 1973.

ERIOCAULON ECHINULATUM Mart.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 129, 132, 136, 141, & 204. 1949; Moldenke, Phytologia 26: 23. 1973.

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Additional citations: CHINA: Kwangtung: Sampson 13453 (Pd, Pd).

ERIOCAULON EDWARDII Fyson

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 24: 358. 1972.

ERIOCAULON ELEGANTULUM Engl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 235, 236, & 253—255. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 114, 117, 118, 120, & 204. 1949; Moldenke, Phytologia 26: 458. 1973.

Brown (1901) cites Dennhardt s.n. and Schweinfurth 3-223 from "British East Africa", Hildebrandt 1056 from Zanzibar, and Holst 3181 from Tanganyika. He comments that "E. elegantulum..... closely resembles E. Hanningtonii, N. E. Br. and E. zambesiense, Ruhland, in general appearance, but the short blackish (not pal-lid) involucre-bracts, which are best seen in the very young heads, readily distinguish it from those species."

Additional citations: TANZANIA: Tanganyika: Schlieben 2348 (E—

1707112).

ERIOCAULON ELENORAE Fyson

Additional synonymy: Eriocaulon eleonorae Fyson apud Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 26: 23 (1973) and 29: 100. 1974.

Santapau 13316, cited below, is a mixture with E. cinereum R. Br.

Additional citations: INDIA: Kerala: Santapau 13316, in part (E-1624131), 13317 (E-1624130), 13318 (E-1624129).

ERIOCAULON ELICHRYSOIDES Bong.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Moldenke, Phytologia 24: 458 & 471 (1972) and 26: 475 & 476. 1973.

ERIOCAULON ESCAPE Hansen

Additional & emended bibliography: B. Hansen, Dansk Bot. Arkiv 27: [31]—33, fig. 1 & 2 a—c. 1969; A. Hansen, Excerpt. Bot. A.19: 245. 1972; Moldenke, Phytologia 24: 458—459 (1972) and 25: 232. 1973.

Emended illustrations: B. Hansen, Dansk Bot. Arkiv 27: 32 & 33, fig. 1 & 2 a—c. 1969.

ERIOCAULON FENESTRATUM Bojer

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 502. 1894; Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 123 & 204. 1949; Moldenke, Phytologia 24: 459. 1972.

ERIOCAULON FLUVIATILE Trimen

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 304. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130 & 204. 1949; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 26: 24 (1973) and 29: 85, 93, 102, & 106. 1974.

Alston (1931) asserts that this taxon and E. barbeyanum Ruhl. may be conspecific.

Collectors have found E. fluviatile growing submerged on sand in streams, in still water, and "abundant in running streams".

The Hu collection cited below, from High Island (Hongkong), is placed here tentatively since it is far out of range. The collector describes it as a "mass-forming herb on rock in swift water, large amount of roots woven into a mat on the rock holding

sand for minerals", found it in flower and fruit in November, and identified it as E. setaceum L.

In Sri Lanka, this past winter, my wife and I found this plant quite common in stagnant pools and very abundant on the dry margins of completely dried-up pools, the entire plants then uniformly dark-brown or almost black. We found several colonies in cold fresh spring water, the plants there almost entirely submerged, the leaves beautiful shiny green, and the inflorescence heads at or just slightly below the surface of the water. All these localities were at about 7000 feet altitude and the plants were in flower and fruit in January. We misidentified the species as E. collinum Hook. f. at the time.

Material has been misidentified and distributed in some herbaria as E. collinum Hook. f., E. dalzellii Körn., and E. rivulare Dalz.

Citations: SRI LANKA: Collector undetermined s.n. [Labugama, Jan. 1885] (Pd, Pd), s.n. [Linigala, Hewessee] (Pd); Ferguson s.n. [Labugama] (Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28279 (Ac, Gz, Kh, Ld, Pd), 28281 (Ac, Ld, Pd, Z), 28292 (Ac, Gz, Ld, Pd); Thwaites C.P. 3057 (Pd—type, Pd—isotype). CHINESE COASTAL ISLANDS: High: S. Y. Hu 8737 (W—2697239, Z).

ERIOCAULON FULVUM N. E. Br.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233 & 248—249. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111—113 & 204. 1949; Moldenke, Phytologia 26: 458—459. 1973.

Brown (1901) cites only the type specimen, Barter s.n., from Northern Nigeria and comments that this is "A very distinct species, easily recognised by its slightly glossy buff-coloured heads."

ERIOCAULON GIBBOSUM Körn.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Moldenke, Phytologia 26: 24. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 63 I. 1863 (N, Z).

ERIOCAULON GIBBOSUM var. MATTOGROSSENSE Ruhl.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Moldenke, Phytologia 24: 460. 1972.

ERIOCAULON GILGIANUM Ruhl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 234, 236, 256, & 257. 1901; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 118 & 204. 1949; Moldenke, Phytolo-

gia 26: 25. 1973.

Brown (1901) keeps E. ciliisepalum Rendle separate from E. gilgianum and cites for it Johnston s.n. and Welwitsch 2445 & 2445b from Angola, where it was collected on spongy slopes and in damp fields in which maize had been cultivated. He comments that "Johnston's specimens are stouter, and have more numerous flowers in the head than any of those collected by Welwitsch, but I find no difference in the structure of the flowers and bracts." For E. gilgianum he cites only Antunes 168, also from Angola, but apparently did not see any material of it since he says that this is "Stated to be the smallest of the African species and one of the smallest species in the genus, having an especially slender appearance on account of the capillary leaves. I have not seen it." Later workers have united the two taxa.

ERIOCAULON GOMPHRENOIDES Kunth

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Phytologia 26: 25. 1973.

Reitz & Klein describe this plant as an "erva, flôr branca" and found it growing at 1400 meters altitude, flowering in December.

Additional citations: BRAZIL: Santa Catarina: Reitz & Klein 7683 (Ll).

ERIOCAULON GREGATUM Körn.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126, 132, & 204. 1949; Moldenke, Phytologia 24: 461. 1972.

The Hooker & Thomson collection, cited below, includes a specimen with one proliferating flower-head.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia, 4000 ped.] (Pd).

ERIOCAULON GRISEUM Körn.

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Phytologia 24: 461. 1972.

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 60 III. 1863 (N, Z).

ERIOCAULON HAMILTONIANUM Mart.

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 41, pl. 1 (II), fig. 7 & 8. 1833; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Moldenke, Phytologia 24: 462 (1972) and 25: 239. 1973.

Additional illustrations: Mart., Erioc. Selbst. Pflanzenfam. pl. 1 (II), fig. 7 & 8. 1833.

Additional citations: MOUNTED ILLUSTRATIONS: Mart., Nov. Act.

Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): pl. 1, fig. 2. 1835 (Mu).

ERIOCAULON HAMILTONIANUM var. MINIMUM Fyson

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Moldenke, Phytologia 24: 462. 1972.

ERIOCAULON HAMILTONIANUM var. MINOR Fyson

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 24: 462. 1972.

ERIOCAULON HENRYANUM Ruhl.

Additional bibliography: Limpr. in Fedde, Repert. Beih. 12: 314. 1922; Wangerin in Just, Bot. Jahresber. 51 (1): 171 [137]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 132 & 204. 1949; Sharma, Nucleus 15: Append. 10. 1972; Moldenke, Phytologia 26: 25. 1973.

Sharma (1972) reports the chromosome count for this species as "c. 56 (57, 58)".

ERIOCAULON HETEROCHITON Körn.

Additional bibliography: Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 123 & 204. 1949; Moldenke, Phytologia 24: 463. 1972.

Perrier de la Bâthie (1934) collected this species in wet places to 1000 meters altitude in Madagascar.

ERIOCAULON HETEROLEPIS Steud.

Additional bibliography: Backer, Handb. Fl. Java 3: 7. 1924; Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: 178 & 844, pl. 188. 1928; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 204. 1949; Moldenke, Phytologia 26: 23 & 25. 1973.

ERIOCAULON HETEROLEPIS var. NIGRICANS Körn.

Additional bibliography: Backer, Handb. Fl. Java 3: 7. 1924; Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: 178 & 844, pl. 188. 1928; Moldenke, Phytologia 24: 463. 1972.

Illustrations: Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: pl. 188. 1928.

ERIOCAULON HEUDELII N. E. Br.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232 & 258. 1901; Moldenke, Phytologia 26: 459. 1973.

Brown (1901) cites only the cotype collections, Heudelot 677 & 678, "without precise locality", from Senegambia.

ERIOCAULON HILDEBRANDTII Körn.

Additional bibliography: Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Phytologia 24: 464. 1972.

ERIOCAULON HONDOENSE Satake

Additional bibliography: Moldenke, *Phytologia* 26: 25--26, 30, & 39. 1973.

Additional citations: JAPAN: Honshu: Togashi MT.6849 [Fl. Jap. Exsicc. 67] (Ws).

ERIOCAULON HOOKERIANUM Stapf

Additional bibliography: Wangerin in Just, Bot. Jahresber. 53 (2): 261. 1925; Moldenke, *Phytologia* 26: 26. 1973.

ERIOCAULON HUMBOLDTII Kunth

Additional bibliography: Moldenke, *Phytologia* 26: 182. 1973.

Hatschbach reports finding this plant in the "brejo" of Mato Grosso.

Additional citations: BRAZIL: Mato Grosso: Hawley, Souza, & Fereira 10400 (E-2048848); Hatschbach 32341 (Ld); Santos, Souza, & Bertolda R.1689 (N).

ERIOCAULON INFAUSTUM N. E. Br.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232 & 253--254. 1901; Moldenke, *Phytologia* 24: 466. 1972.

Brown (1901) cites only the original type collection, Scott s. n., from rice fields in Quilimane, Mozambique, but he notes that "This is probably the same as a plant collected in Zanzibar by Bojer (88), which is quoted by Koernicke in *Linnaea* xxvii. 646; in Durand & Schinz, *Conspect. Fl. Afr. v.* 503; in Engl. Pfl. Ost-Afr., C.133; and by Ruhland in Engl. Jahrb. xxvii. 81, under E. trilobum, Ham."

ERIOCAULON INFIRMUM Steud.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 126 & 204. 1949; Sharma, *Nucleus* 15: Append. 10. 1972; Moldenke, *Phytologia* 26: 25 & 26. 1973.

Sharma (1972) reports the chromosome count for this species as 30.

ERIOCAULON INFIRMUM var. *KURZII* (Fyson) Moldenke

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, *Phytologia* 24: 466. 1972.

ERIOCAULON INTERMEDIUM Körn.

Emended synonymy: *Eriocaulon setaceum* Hook. f. ex Alston in Trimen, *Handb. Fl. Ceylon* 6: 304, in syn. 1931 [not *E. setaceum* Auct. ex Backer & Bakh., 1968, nor Benth., 1893, nor Crantz, 1959, nor Heyne, 1832, nor L., 1753, nor Lour., 1790, nor Rottl., 1960, nor Steen., 1960, nor Wight, 1832, nor Willd., 1959].

Additional & emended bibliography: Thwaites, *Enum. Pl. Zeyl.* 2:

341. 1839; Hook. f. in Trimen, Fl. Ceylon 5: 2. 1900; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 304. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Satake, Journ. Jap. Bot. 46: 372 [20]. 1971; Moldenke, Phytologia 26: 26 (1973) and 29: 85. 1974.

The Thwaites C.P. 791, in part, distributed as and previously cited by me as E. intermedium, seems actually to be E. setaceum L. On the other hand, some material of E. intermedium has been misidentified and distributed in some herbaria as E. capillus-naiadis Hook. f. These three taxa certainly need critical revision.

Alston (1931) cites Fyson's work (1921) as "1923". The E. setaceum accredited to "Auct. ex Backer & Bakh." and to Van Steenis in the synonymy cited above is a synonym of E. equisetoides Van Royen, while that credited to Bentham is E. bifistulosum Van Heurck & Muell.-Arg., that credited to Rottböll and to Willdenow is E. cinereum R. Br., that credited to Heyne is E. sexangulare L., that credited to Wight is E. quinquangulare L., and the E. setaceum of Loureiro is Fimbristylis setacea Benth.; E. setaceum L. is a valid species, with E. setaceum Crantz in its synonymy.

Additional citations: INDIA: Gujarat: Nain 1080 (Ac).

ERIOCAULON JAUENSE Moldenke

Additional bibliography: Moldenke, Phytologia 26: 26. 1973; Hocking, Excerpt. Bot. A.23: 290. 1974.

ERIOCAULON JOHNSTONII Ruhl.

Additional bibliography: Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Phytologia 24: 467. 1972.

Perrier de la Bâthie (1934) records this species from "Marais: Côte orientale. — E. -- Madag. et Maurice." I have seen no material of it from Madagascar. All that I have seen has been from Mauritius.

ERIOCAULON KINLOCHII Moldenke

Additional bibliography: Moldenke, Phytologia 24: 468 (1972) and 25: 227. 1973.

ERIOCAULON KLOTZSCHII Moldenke

Additional bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 204. 1949; Moldenke, Phytologia 24: 468. 1972.

ERIOCAULON KOERNICKEI Britten

Additional bibliography: Moldenke, Phytologia 24: 468--469 (1972) and 25: 152. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 60 II. 1863 (N, Z).

ERIOCAULON KÖRNICKIANUM Van Heurck & Muell.-Arg.

Additional bibliography: Moldenke, Phytologia 26: 459. 1973.

Additional citations: ARKANSAS: Logan Co.: R. Kral 24579 (W—2470357). OKLAHOMA: Pushtamaha Co.: E. J. Palmer 8320 (W—1531435).

ERIOCAULON LANCEOLATUM Miq.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 24: 269 (1972) and 28: 444. 1974.

Additional citations: INDIA: Kerala: Stocks, Law, &c. s.n. [Malabar, Concan] (Pd).

ERIOCAULON LANCEOLATUM var. PILOSUM Moldenke

Additional bibliography: Moldenke, Phytologia 24: 469—470 (1972) and 28: 444. 1974.

Additional citations: INDIA: Kerala: Santapau 13361 (E—1624111).

ERIOCAULON LATIFOLIUM J. E. Sm.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 235 & 243. 1901; Moldenke, Phytologia 26: 459—460. 1973.

Brown (1901) cites Barter s.n., Don s.n., and Vogel s.n. from Sierra Leone, collected in rivulets, and comments that "In the original description the sepals of the male flowers are stated to be connate into a 3-lobed tube, but in all the flowers I have dissected they are free."

ERIOCAULON LEUCOMELAS Steud.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 306. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 875 [thesis]. 1973; Moldenke, Phytologia 26: 27—28 (1973) and 28: 444. 1974.

Alston (1931) suggests that this species and E. collinum Hook. f. are conspecific, with E. leucomelas having nomenclatural priority.

Additional citations: INDIA: Kerala: Santapau 13099 (E—1624153), 13168 (E—1624445).

ERIOCAULON LIGULAEFOLIUM Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931.

Bibliography: Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 28: 445 (1974) and 29: 86. 1974.

Alston (1931) asserts that this taxon differs from E. thwaitesii Körn. in having its leaves 1/6 inch wide at the base (rather

than 1/3 inch) and the petals oblanceolate (rather than linear). He designates no type, but obviously has based his description on Ceylonese specimens. The name does not occur on any herbarium sheets that I have seen in the Peradeniya herbarium, nor has my friend, Magdon Jayasuriya, been able to locate any specimen so named by Alston at Peradeniya.

ERIOCAULON LIGULATUM (Vell.) L. E. Sm.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & 1157, map 1775, & Ind. 12. 1972; Moldenke, Phytologia 26: 460 & 476 (1973) and 28: 438. 1974.

Reitz and his associates describe this plant as an "erva" from "banhado do campo" or "campo úmido", with white flowers, and found it growing at altitudes of 2 to 1300 meters, flowering in September and October.

The Irwin, Harley, & Onishi 29319, cited below, has been distributed to at least some herbaria by the New York Botanical Garden as "Syngonanthus densifolius var. majus Moldenke Det. H. Moldenke, 1972", but this was doubtless due to an error in transcription since I reported the number in writing to the New York Botanical Garden authorities as Eriocaulon ligulatum when it was submitted to me for determination.

For some reason unknown to me, the United States National Herbarium photograph of one of the Berlin herbarium sheets of Sellow B.1290 C.263 has been distributed to other herbaria with a printed label reading "Sellow B-1290 292". The original specimens represented by this photograph and by the ten other photographs cited by me are all deposited in the herbarium of the Botanisches Museum in Berlin and have been seen and annotated by me.

Additional citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 29319 (N); Sellow B.1290 (S--photo, Z--photo), B.1290 C.263 (S--photo, S--photo, Z--photo, Z--photo). Paraná: Hatschbach 22267 (W--2706985), 24920 (S). Rio Grande do Sul: Rambo 52183 (Rd--5673), 54575 (Rd--12280). Santa Catarina: Klein 4336 (Ld); Reitz & Klein 10120 (Ld), 13403 (Ld), 13478 (Ld), 13580 (Ac), 13618 (Ld), 13744 (Ld), 13772 (Ac); Smith & Klein 8242 (S). Santa Catarina Island: Klein & Eresolin 7592 (Ac). São Paulo: L. Riedel 2388 (S--photo, Z--photo). MOUNTED ILLUSTRATIONS: notes and drawings by Körnicke (S--photo, Z--photo).

ERIOCAULON LINEARE Small

Additional bibliography: Kral, Rhodora 75: 382--383. 1973; Moldenke, Phytologia 26: 183 (1973), 27: 444 (1974), 28: 428 (1974), and 29: 103, 104, & 111. 1974.

Recent collectors have found this plant in flower and fruit in June, August, and September. Henderson encountered it on the sandy margins of a small lake.

Kral (1973) cites Kral 36821 & 39494 from Baldwin County and Kral 43124 from Houston County, Alabama, and found it growing in

the peaty edges of a Hypericum pond, in wet sands and shallows of a lake shore, sandy beaches, and "abundant on wet sandy pond shores or submerged in shallows". He notes that "This species, while already reported for Alabama by Harper, is rare there. It is part of a group of species that frequents sandy shores of sinkhole lakes and ponds, in contrast to its nearest relative taxonomically, E. texense, which frequents acid pineland bogs from Texas to Georgia and which has usually died back by the time E. lineare comes into bloom and seed."

The scapes on R. M. Harper 830 are 6-angled. Harper 1608 is a mixture with Syngonanthus flavidulus (Michx.) Ruhl. Material of E. lineare has been misidentified and distributed in some herbaria as Lachnocaulon glabrum Körn. and very often as E. pellucidum Michx. On the other hand, the Small, DeWinkeler, & Rane 9815, distributed as E. lineare, is actually E. compressum Lam., Braun s.n. [July 26, 1938] is E. decangulare f. parviceps Moldenke, and R. M. Harper 85 is the type collection of E. lineare var. gigas Moldenke.

Additional citations: GEORGIA: Baker Co.: R. Kral 27079 (W--2673952); Thorne 4370 (W--2005928). Bulloch Co.: R. M. Harper 830 (W--400279--isotype). Lowndes Co.: R. M. Harper 1608, in part (W--431916). Sumter Co.: R. M. Harper 1395 (W--431698). FLORIDA: Bay Co.: R. Kral 15671 (W--2470350). Gulf Co.: Biltmore Herb. 3865 (W--955020), 3865a (W--335191). Leon Co.: R. M. Harper 223 (W--504585); N. C. Henderson 64-237 (Bl--199070); Kral & Godfrey 15575 (W--2470298), 15585 (W--2470351); Pelton s.n. [July 14, 1961] (W--2385072). Wakulla Co.: R. Kral 23024 (W--2470344). Walton Co.: R. M. Harper 47 (W--513528); R. Kral 17748 (W--2470349). ALABAMA: Baldwin Co.: R. M. Harper 22 (W--2365897). Covington Co.: R. Kral 36821 (W--2673938), 39494 (W--2673934). Houston Co.: R. Kral 43404 (W--2673936).

ERIOCAULON LINEARE var. GIGAS Moldenke, Phytologia 27: 444. 1974.

Bibliography: Moldenke, Phytologia 27: 444 (1974) and 28: 428. 1974.

The type collection of this variety was inaccurately cited by me previously as typical E. lineare Small.

Citations: FLORIDA: Santa Rosa Co.: R. M. Harper 85 (N--type, W--514644--isotype).

ERIOCAULON LINEARIFOLIUM Körn.

Additional bibliography: Moldenke, Phytologia 26: 28. 1973.

Additional citations: BRAZIL: Bahia: Anderson, Stieber, & Kirkbride 36810 (N). Mato Grosso: Hatschbach & Guimarães 24560 (S).

ERIOCAULON LIVIDUM F. Muell.

Additional bibliography: Beard, West Austr. Pl., ed. 2, 25.

1970; Moldenke, Phytologia 24: 473. 1972.

ERIOCAULON LONGICUSPE Hook. f.

Additional synonymy: Eriocaulon cristatum var. bracteais floralibus denticulatis et longiuscule cuspidato-acuminatis Thwaites, Enum. Pl. Zeyl., pr. 1, 341. 1864. Eriocaulon cristatum var. Thwaites ex Hook. f. in Trimen, Handb. Fl. Ceylon 5: 3--4, in syn. 1900.

Additional bibliography: Thwaites, Enum. Pl. Ceylon, pr. 1, 341. 1864; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Moldenke, Phytologia 24: 473 (1972), 26: 19 (1973), 28: 456 (1974), and 29: 85, 92, 98, & 105. 1974.

Gunawardena (1968) asserts that the specific epithet applied to this taxon refers to the "long black cusp" on the bracteoles. Wheeler encountered the plant in "sunny mucky wet meadows" at 4700 feet altitude, flowering and fruiting in July.

The Thwaites variety, cited in the synonymy above, was first placed here by Hooker (1900). I erroneously placed it under E. ceylanicum Körn. in earlier installments of this series of notes. The Jayasuriya & Sumithraarachchi 1567, distributed as E. longicuspe, is actually E. atratum var. major Thwaites.

Additional citations: SRI LANKA: G. Gardner s.n. [Thwaites C. P. 789] (Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28301 (W); L. C. Wheeler 12176 (Pd).

ERIOCAULON LONGIPETALUM Rendle

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232 & 236--237. 1901; Moldenke, Phytologia 24: 473. 1972.

Brown (1901) cites only the type collection of this species and states that the type locality is an area 3800 to 5500 feet in altitude.

ERIOCAULON LUZULAEFOLIUM Mart.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135] (1929) and 50 (1): 231. 1930; Alston in Trimen, Handb. Fl. Ceylon 6: 306. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 26: 20 & 28--29 (1973) and 29: 101 & 102. 1974.

Thwaites (1839) places E. trilobum Hamilt. in the synonymy of E. luzulaefolium, but I regard it as a synonym of E. sollyanum Royle. He cites C.P. 796 for E. luzulaefolium, but I regard that and the Craig 6, also distributed as E. luzulaefolium, as E. collinum Hook. f., while the Collector undetermined s.n. [Dolosbagie, April 1882] is actually E. quinquangulare L.

Eriocaulon luzulaefolium is recorded for Sri Lanka (based on a

Gardner collection) by Hooker in Trimen's Flora and by Ruhland (1903), but Fyson states that "The Ceylon plant, C.P. 796, so named, has none of the characteristic truncate appearance of the head on a saucer-shaped involucre and is E. collinum." This is true of C.P. 796, but some of the specimens filed as E. collinum in some herbaria certainly do have the truncate appearance he ascribes to E. luzulaefolium.

Additional citations: INDIA: Assam: Jenkins s.n. [Assam] (Pd).

ERIOCAULON MACROBOLAX Mart.

Additional bibliography: Moldenke, Phytologia 24: 474. 1972.

Someone (Martius? Körnicke?) has written on one of the labels of a Martius collection in the Munich herbarium "Cfr. Dupatya ligulata Vell. Fl. Flum. l. t. 86" and it is indeed very possible that E. macrobolax is conspecific with E. ligulatum (Vell.) L. B. Sm. The sheaths are completely truncate at their apex in all the Martius collections cited below.

Additional citations: BRAZIL: Minas Gerais: Martius s.n. [in udis deserti versus fluv. Rio S. Franc. vergentibus et in Serra de S. Antonio Minas; Macbride photos 18688] (Mu--type), s.n. [in udis fluvii Rio de São Francisco: Caiteté] (Mu, Mu, Z).

ERIOCAULON MACROPHYLLUM Ruhl.

Additional bibliography: Backer, Handb. Fl. Java 3: 6. 1924; Moldenke, Phytologia 24: 474 (1972) and 29: 94. 1974.

Backer (1924) is of the opinion that E. macrophyllum is conspecific with, and the name a synonym of, E. blumei Körn.

ERIOCAULON MAGNIFICUM Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.18: 444. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Moldenke, Phytologia 26: 23, 28, 29, & 35 (1973) and 28: 438. 1974.

The original specimen represented by the photograph cited below, Ule 1689, is deposited in the herbarium of the Staatsinstitut für Allgemeine Botanik in Hamburg and has been seen and annotated by me.

Klein & Bresolin describe the plant as an "erva, flôr branca" and have collected it in "banhado", at 10 meters altitude, flowering in July.

Additional citations: BRAZIL: Santa Catarina: Ule 1689 (Z-- photo of isotype). Santa Catarina Island: Klein & Bresolin 6086 (Ld).

ERIOCAULON MAGNIFICUM var. GOYAZENSE Moldenke

Additional bibliography: Moldenke, Phytologia 24: 475. 1972.

Additional citations: BRAZIL: Goiás: Héringer & Lima 11717 (N-- isotype).

ERIOCAULON MAGNUM Abbiatti

Additional bibliography: Moldenke, *Phytologia* 26: 460. 1973.

Additional citations: PARAGUAY: Hassler 9428 (Ca-929581).

ERIOCAULON MANNII N. E. Br.

Additional & amended bibliography: N. E. Br. in *Thiselt.-Dyer*, *Fl. Trop. Afr.* 8: 234 & 241. 1901; Moldenke, *Phytologia* 24: 476. 1972.

Brown (1901) cites only Mann 1682, the type collection, which he says is from "Lower Guinea. Gaboon: Sierra del Crystal."

ERIOCAULON MARGARETAE Fyson

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 53 (1): 60 [42]. 1928; Venkatareddi, *Bull. Bot. Surv. India* 12: 220. 1970; Moldenke, *Phytologia* 24: 476. 1972; R. R. Rao, *Stud. Flow. Pl. Mysore Dist.* 2: 875 [thesis]. 1973.

Venkatareddi (1970) refers to this plant as "Occasional", flowering in October and November, and cites his no. 101030.

ERIOCAULON MEGAPOTAMICUM Malme

Additional bibliography: Moldenke, *Phytologia* 25: 126. 1973.

This species has been collected in flower and fruit from January to March.

Additional citations: BRAZIL: Rio Grande do Sul: Rambo 45243 (Rd-12296), 46190 (Rd-12297), 54863 (Rd-12293).

ERIOCAULON MELANOCEPHALUM Kunth

Additional bibliography: N. E. Br. in *Thiselt.-Dyer*, *Fl. Trop. Afr.* 8: 240. 1901; Perrier de la Bâthie, *Cat. Pl. Madag.* 21. 1934; Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1156-1157 & Ind. 12. 1972; Moldenke, *Phytologia* 26: 460 (1973) and 28: 456. 1974.

Additional citations: BRAZIL: Goiás: Irwin, Anderson, Stieber, & Lee 34424 (N). Mato Grosso: Richards 6496a (N), 6496/6496a (N).

MOUNTED ILLUSTRATIONS: Körn. in *Mart., Fl. Bras.* 3 (1): pl. 63. 1863 (N, Z).

ERIOCAULON MELANOCEPHALUM ssp. USTERIANUM Beauverd

Additional synonymy: Eriocaulon melanocephalum var. usterianum Beauverd ex Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1157. 1972.

Additional bibliography: Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1157 & Ind. 12. 1972; Moldenke, *Phytologia* 24: 477 (1972) and 28: 456. 1974.

ERIOCAULON MELANOLEPIS Alv. Silv.

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 53 (1): 60 [42]. 1928; Wangerin in *Just, Bot. Jahresber.* 51 (1): 169 [135]. 1929; Fedde in *Just, Bot. Jahresber.* 51 (2): 296. 1933; Moldenke, *Phytologia* 26: 29 (1973) and 29: 94. 1974.

ERIOCAULON MESANTHEMOIDES Ruhl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 235, & 244—245. 1901; Moldenke, Phytologia 26: 30. 1973.

Brown (1901) cites Goetze 293 and Stuhlmann 9143 from Tanganyika and comments that "In the very imperfect description given by Ruhland the flower-heads are described as somewhat glabrous (glabrusculis), and the involucre-bracts as greenish-fusces. I have not seen Stuhlmann's 9143, but in the plant collected by Goetze (from which I have made the above description), the heads are densely white-pubescent, and the involucre-bracts white. The numerous, narrow, very prominent ribs on the peduncles are quite different from those of any other African species I have examined!"

ERIOCAULON MICROCEPHALUM H.B.K.

Additional bibliography: Wikstr., K. Svensk. Vet. Acad. Handl. Stockh., ser. 2, 1: 12. 1820; Wkstr., Trenne Nya Art. Örtsl. Erioc. (repr.) 12. 1821; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 78, fig. 28-B. 1969; Moldenke, Phytologia 26: 461 (1973) and 28: 435. 1974.

Additional illustrations: Sanchez Sanchez, Fl. Val. Mex., ed. 1, fig. 38-B. 1969.

Martin & Plowman describe this plant as a "prostrate" herb, growing in moist places. Sanchez Sanchez says that it blooms from June to August in the Valley of Mexico.

The Lent 143, distributed as E. microcephalum and so cited by me in 1969, is actually Paepalanthus kupperi Suesseng.

Additional citations: COSTA RICA: San José: Taylor & Taylor 11738 (N). COLOMBIA: Cundinamarca: Martin & Plowman 81 (Oa).

ERIOCAULON MINIMUM Lam.

Additional bibliography: A. Rich., Tent. Fl. Abyss. 2: 347. 1851; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 306. 1931; Alston, Kandy Fl. 76. 1938; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 24: 477—478 (1972), 26: 19 (1973), and 29: 86, 87, & 100. 1974.

Alston (1931) suggests that E. minimum is conspecific with E. truncatum Hamilt. He found it growing among moss at an altitude of 400 feet and it has been collected in anthesis in December. Material has been distributed in some herbaria as E. truncatum Hamilt.

Citations: SRI LANKA: Alston 1039 (Pd); Collector undetermined s.n. [Dambulla Rock, 20 Dec. 1881] (Pd).

ERIOCAULON MINUTUM Hook. f.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Venkatareddi, Bull. Bot. Surv. India 12: 220. 1970; Moldenke, Phytologia 24: 478. 1972.

Venkatareddi (1970) found this plant to be "Frequent", flower-

ing from September to January, and cites his nos. 93425 & 100942. The Collector undetermined s.n. [Dambulla Rock, 20 Dec. 1881], distributed as E. trimeni, is actually E. cinereum R. Br.

ERIOCAULON MIQUELIANUM Körn.

Additional bibliography: Ikuse, Pollen Grains Jap. 46. 1956; Moldenke, Phytologia 26: 30. 1973.

Additional citations: JAPAN: Honshu: Togashi MT.6857 [Fl. Jap. Exsicc. 68] (Ws).

ERIOCAULON MISERUM Körn.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 26: 30. 1973.

ERIOCAULON MITOPHYLLUM Hook. f.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 24: 479. 1972.

ERIOCAULON MODESTUM Kunth

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157 & Ind. 12. 1972; Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 26: 27 & 30--31 (1973) and 28: 438. 1974.

Recent collectors have encountered this species on campos and in wet sandy places, flowering in October. Klein & Bresolin describe it as an "erva, flôr creme". The Rambo 56190, distributed as E. modestum, is actually Leiothrix flavescens (Bong.) Ruhl., while Glaziou 22309 is Paepalanthus pubescens Körn.

Additional citations: BRAZIL: Rio Grande do Sul: Rambo 47053 (Rd--12289), 56190 (Rd--12287), 56464 (Rd--12288). Santa Catarina Island: Klein & Bresolin 6277 (Ld). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 62 II. 1863 (N, Z).

ERIOCAULON MODESTUM var. BREVIFOLIUM Moldenke

Additional bibliography: Moldenke, Phytologia 24: 479. 1972.

Additional citations: BRAZIL: Goiás: Irwin, Grear, Souza, & Reis dos Santos 13781 (N--isotype, W--2709895--isotype); Irwin, Harley, & Smith 32175 (N).

ERIOCAULON MODESTUM f. GRANDIFOLIUM Herzog

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157 & Ind. 12. 1972; Moldenke, Phytologia 24: 479. 1972.

ERIOCAULON MODESTUM f. VIVIPARUM Herzog

Additional bibliography: Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 26: 30--31. 1973.

ERIOCAULON MONTANUM Van Royen

Additional bibliography: Moldenke, *Phytologia* 24: 481. 1972.

Kalkman describes this plant as "forming dense mats on slightly damper places; many seedlings between the mature plants; seeds germinating ON the plant; involucre bracts membranous; anthers black; pollen white; styles light-green", and found it growing in fire-induced grass- and fen-fields, at 3540 meters altitude, noting "also collected in FAPA".

Additional citations: NEW GUINEA: Papua: Kalkman 4833 (Ca--M263613).

ERIOCAULON MUTATUM N. E. Br.

Additional & emended bibliography: N. E. Br. in *Thiselt.-Dyer, Fl. Trop. Afr.* 8: 232 & 256--257. 1901; Moldenke, *Phytologia* 26: 461. 1973.

Brown (1901) cites only Welwitsch 2448, 2449, & 2450 from Angola.

ERIOCAULON NAKASIMANUM Satake

Additional & emended bibliography: Satake, *Journ. Jap. Bot.* 46: 110 & 111 [13 & 15]. 1971; Moldenke, *Phytologia* 24: 481 & 482. 1972.

ERIOCAULON NANTOENSE Hayata

Additional bibliography: Wangerin in *Just, Bot. Jahresber.* 49 (1): 160. 1927; Fedde in *Just, Bot. Jahresber.* 49 (2): 423. 1932; Moldenke, *Phytologia* 26: 461. 1973.

ERIOCAULON NASUENSE Satake

Additional & emended bibliography: Satake, *Journ. Jap. Bot.* 46: 109--111 [13--15], fig. 1 & 2. 1971; Moldenke, *Phytologia* 26: 31. 1973.

Emended illustrations: Satake, *Journ. Jap. Bot.* 46: 109 & 110 [13 & 14], fig. 1 & 2. 1971.

ERIOCAULON NEESIANUM Körn.

Additional bibliography: Alston in *Trimen, Handb. Fl. Ceylon* 6: 305. 1931; Moldenke, *Phytologia* 24: 482 (1972) and 26: 41. 1973.

Alston (1931) avers that this species was based originally on Thwaites C.P. 790 and "seems scarcely distinct from E. thwaitesii Körn. though it is kept up by Ruhland". I regard C.P. 790 (at least in part) as E. truncatum Hamilt. It must be remembered, however, that Thwaites' "C. P." numbers are in very many cases mixtures of plants collected in often widely separated places, often by different collectors, and very often represent several species. Actually Körnicke's original description does not cite any collector or collector's number. It merely says "Ceylon (Hb. Berol. ex Hb. N. ab E. In Hb. Kegel. sine patria et collectore indicato". The Berlin specimen, which I have seen, is G. Gardner 936.

Alston also claims that this species is mentioned in Fyson, Journ. Indian Bot., page 63, but I can find no such mention on that page either in volumes 2 or 3 in which Fyson wrote on the Eriocaulaceae.

ERIOCAULON NEGLECTUM Ruhl.

Additional bibliography: Moldenke, Phytologia 24: 479 & 482—483. 1972.

The Lützelburg collection, cited below, is a mixture with Paepalanthus lamarckii Kunth and Syngonanthus gracilis var. temis-sinus Ruhl. It was collected on moist campos, flowering in August.

Additional citations: BRAZIL: Amazonas: Lützelburg 20687, in part (Mu).

ERIOCAULON NEPALENSE Prescott

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 26: 461. 1973.

The flower-heads on Nath 4552 are black, while on Nath 4504 they are merely blackish.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia, 0—6000 ped.] (Pd). East Punjab: Nath 4504 (Kh), 4552 (Kh). Kerala: Stocks, Law, &c. s.n. [Malabar, Concan] (Pd).

ERIOCAULON NILAGIRENSE Steud.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 168 [134]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 305. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 295. 1933; Moldenke, Phytologia 24: 461 (1973), 28: 401, 444, & 445 (1974), and 29: 86, 96, & 97. 1974.

Recent collectors have found this plant growing in swampy depressions in wet black patana grasslands along streams with grasses, in wet (running water) situations in small valleys, in wet meadows along small streams, on steep slopes with wet flush and melastome shrubs, in shade along paths, along rivulets in sunny meadows, in open marshy ground, and in the transition zone between wet patana and forest, at altitudes of 1665 to 2700 meters in Sri Lanka, flowering and fruiting there from January to March and May to October. Cramer refers to it as "common" or "fairly common", Koyama as "locally abundant", and Comanor as a "frequent fleshy plant". Cramer speaks of the flowering heads as being "snowy-white", 1.2—1.4 cm. in diameter, and Comanor and Koyama refer to them as "white". Hepper says that the plants are "shortly tufted".

Material has almost uniformly been identified and distributed as E. brownianum Mart., a species with glabrous foliage, sheaths, and scapes, or as E. wightianum Mart. Thwaites C.P. 378 is a mixture with E. brownianum var. latifolium Moldenke.

My wife and I found E. nilagirensis extremely widespread and abundant in many localities on the Horton Plains of Sri Lanka.

The T. Koyama 13642 in the Britton Herbarium, as well as Bembower 429, previously cited by me as typical E. nilagirensis, are actually f. parvifolium Moldenke.

Additional citations: SRI LANKA: Collector undetermined s.n. [Knuckles, 1881] (Pd), s.n. [Naha Eliya, 6.V.96] (Pd); Comanor 980 (Pd); Cramer 3149 (Pd); Gould & Cooray 13760 (Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28269 (Ac, Ca, E, Gz, Kh, Ld, Pd, Tu, Z), 28270 (Ac, Ld, Pd), 28274 (Ac, E, Gz, Kh, Ld, Pd, Tu); Mueller-Dombois & Comanor 67070941 (Pd); A. M. Silva s.n. [Sita Eliya, 21/3/06] (Pd).

ERIOCAULON NILAGIRENSIS f. PARVIFOLIUM Moldenke, *Phytologia* 28: 401. 1974.

Bibliography: Moldenke, *Phytologia* 28: 401, 444, & 445. 1974.

This form differs from the typical form of the species in its shorter leaves at time of anthesis, these being in general only 8--18 cm. long.

The type of this form was collected in a ditch in black parana grassland on the Horton Plains along the road from Farr Inn to World's End, at an altitude of 7000 feet, Nuwara-Eliya District, in the Central Province of Sri Lanka. Other collectors have found the form along rivulets in sunny meadows, at the wet edges of narrow streams mixed with Fimbristylis monticola and Carex arnot-tiana, and on "steep slopes with a wet flush and melastomaceous shrubs", at altitudes of 6300--8100 feet, flowering in January, May, and June. My wife and I found it quite abundant in various habitats in the highlands.

Additional citations: INDIA: Madras: Bembower 429 (Ca--495797, N). SRI LANKA: Cramer 3259 (Pd); G. Gardner 938 (Pd); Hepper 4428 (Pd, W--2720003); Hoogland 11504 (Pd); T. Koyama 13521 (Pd), 13642 (N); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28273 (Ac, Ca, Gz, Kh, Ld, Pd, Tu), 28275 (Pd), 28276 (Ac--isotype, Gz--isotype, Kh--isotype, Ld--isotype, Pd--isotype, Tu--isotype, Z--type), 28278 (Ac, Gz, Kh, Ld, Pd), 28286 (Pd), 28298 (Ac, Gz, Ld, Pd), 28300 (W), 28302 (Pd); J. M. Silva s.n. [Horton Plains, 20/5/1911] (Pd); N. D. Simpson 9427 (Pd); Thwaites C.P. 378, in part [Nuwara Eliya, 1851] (Pd), C.P. 378, in part [Ambagamuwa, 1854] (Pd); Trimen s.n. [Dumbanagala Hill, Sept. 1888] (Pd); L. C. Wheeler 12534 (Pd, W--2716373); J. C. Willis s.n. [Horton Plains, 26/1/06] (Pd).

ERIOCAULON NIPPONICUM Maxim.

Additional & emended bibliography: Ikuse, *Pollen Grains* Jap. 46. 1956; Satake, *Journ. Jap. Bot.* 46: 372--373 [20--21]. 1971; Moldenke, *Phytologia* 26: 32 & 39. 1973.

ERIOCAULON ODORATUM Dalz.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 24: 485. 1972; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 875 [thesis]. 1973; Moldenke, Phytologia 28: 444. 1974.

Material of this species has been misidentified and distributed in some herbaria as E. wightianum Mart.

Additional citations: INDIA: Indore: Siranji s.n. [31.3.69] (Oa). Kerala: Stocks, Law, &c. s.n. [Malabar, Concan] (Pd).

ERIOCAULON ORYZETORUM Mart.

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 29. 1833; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Sharma, Nucleus 15: Append. 10. 1972; Moldenke, Phytologia 26: 32. 1973.

Sharma (1972) reports a chromosome count of "c. 60, 90" for this species.

ERIOCAULON OVOIDEUM Britton & Small

Additional bibliography: Moldenke, Phytologia 24: 286. 1972.

Additional citations: ISLA DE PINOS: Killip 42859 (S).

ERIOCAULON PALUDICOLA Alv. Silv.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 26: 32. 1973.

ERIOCAULON PARAGUAYENSE Körn.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157 & Ind. 12. 1972; Moldenke, Phytologia 24: 488. 1972.

ERIOCAULON PARKERI B. L. Robinson

Additional & amended bibliography: R. McVaugh, N. Y. State Mus. Bull. 360A: 93. 1958; Sharma, Nucleus 15: Append. 10. 1972; W. Stone, Pl. South. N. J., pr. 2, 323 & 324. 1973; Moldenke, Phytologia 26: 461 (1973) and 28: 427. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 120, 382, 480, 509, 559, 625, & 762. 1974.

Additional citations: QUEBEC: Québec Co.: Raymond, Kucyniak, Marie-Victorin, & Rolland-Germain 55073 (W--1948438). MAINE: Penobscot Co.: Fernald & Long 13166 (W--1328989). Sagadahoc Co.: Fernald & Long 174 (W--986888). MASSACHUSETTS: Plymouth Co.: Fernald & Svenson 860 (W--1885738). CONNECTICUT: New London Co.: R. W. Woodward s.n. [Sept. 2, 1918] (W--1011651). NEW YORK: Iona Island: Muenschler & Curtis 5598 (W--1725373). Rogers Island: Muenschler & Curtis 5600 (W--1725374). PENNSYLVANIA: Lancaster Co.: Heller & Halbach s.n. [September 12, 1891] (W--45303, W--406592).

MARYLAND: Baltimore Co.: Hermann 9797 (W--1732730). Cecil Co.: Abbott 2432 (W--1285371, W--2160446), s.n. [Aug. 8, 1926] (W--1683397); Leonard & Leonard 5779 (W--1242708, W--2160547). Charles Co.: E. H. Walker 3868 (W--1920882). Harford Co.: Shull 69 (W--640867). Wicomico Co.: Canby s.n. [Sept. 8, 1887] (W--45287); Shreve & Jones 1204 (W--608541). Worcester Co.: E. H. Walker 4220 (W--2005339). DISTRICT OF COLUMBIA: Steele s.n. [Aug. 28, 1896] (W--363621); Ward 113 (W--937192), s.n. [Sept. 10, 1882] (W--152101). VIRGINIA: Alexandria City: Dowell 6451 (W--640425). Fairfax Co.: Blake 8921 (W--1285196); F. W. Pennell 2587 (W--648276); Uhler s.n. [August 6, 1933] (W--2422085). James City Co.: Fernald & Long 10988 (W--1810142). New Kent Co.: Fernald & Long 13576 (W--2003389). County undetermined: L. F. Ward s.n. [Near Custis Spring, Sept. 29, 1878] (W--243902), s.n. [Virginia, 1878] (W--242420). NORTH CAROLINA: Tyrrell Co.: Radford 44454 (Ca--M158293).

ERIOCAULON PARVUM Körn.

Additional & emended bibliography: Ikuse, Pollen Grains Jap. 46. 1956; Satake, Journ. Jap. Bot. 46: 373 [21]. 1971; Moldenke, Phytologia 24: 489. 1972.

ERIOCAULON PELLUCIDUM Michx.

Additional synonymy: Eriocaulon triangulare With. ex Moldenke, Phytologia 28: 457, in syn. 1974. Eriocaulon articulatum Hudson ex Moldenke, Phytologia 28: 456, in syn. 1974.

Additional & emended bibliography: J. Jacks., Fl. Worcester Co., ed. 2, 56. 1894; Twining, Fl. Northeast. Penn. 24. 1917; Wangerin in Just, Bot. Jahresber. 53 (2): 261. 1925; Blewitt, Fl. Waterbury 39. 1926; Rydb., Fl. Prairies & Plains, pr. 1, 198 & 940, fig. 107. 1932; Dole, Fl. Vt., ed. 3, 78. 1937; Erdtman, Introd. Pollen Analys. 56, [57], & 236, pl. 1, fig. 10 & 11. 1943; Scoggan, Natl. Mus. Canada Bull. 115: 146. 1950; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 163 & 523, fig. 94A. 1952; E. G. Voss, Mich. Bot. 4: 17, 22, & 23. 1965; Stuckey, Mich. Bot. 5: 105. 1966; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, pr. 1, 163 & 523, fig. 94A (1966) and ed. 2, pr. 2, 163 & 523, fig. 94A. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 1: 198, fig. 107 (1971) and pr. 2, 2: 940. 1971; Sharma, Nucleus 15: Append. 10. 1972; Thorne, Quart. Rev. Biol. 47: 370. 1972; W. Stone, Fl. South. N. J., pr. 2, 323 & 324, pl. 28, fig. 1. 1973; Moldenke, Phytologia 26: 461--462 (1973), 28: 426, 427, 429, & 457 (1974), and 29: 86, 103, 107, & 110. 1974; Howes, Dict. Useful Pl. 86. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Étud. Nord. 7:] 120, 470, 498, 509, 705, & 762. 1974.

Additional & emended illustrations: Rydb., Fl. Prairies & Plains, pr. 1, 198, fig. 107. 1932; Erdtman, Introd. Pollen Analys. [57], pl. 1, fig. 10 & 11. 1943; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 163, fig. 94A (1952), ed. 2, pr. 1, 163, fig.

94A (1966), and ed. 2, pr. 2, 163, fig. 94A. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 1: 198, fig. 107. 1971; W. Stone, Pl. South. N. J., pr. 2, pl. 28, fig. 1. 1973.

Erdtman (1943) describes the pollen as "Grains spheroidal; exine folded into long, low ridges separated by narrow grooves, which functionally correspond to the furrows in other grains. The grains are subechinate or warty, provided with a faint reticulate texture. The pollen grains of Aphyllanthes monspeliensis [Aphyllanthaceae] as well as the grains of some species of Berberis [Berberidaceae] and Pinguicula [Lentibulariaceae] show certain resemblances to those of Eriocaulon."

The scapes on W. H. Brown 66 are 6--8-angled. Dole (1937) refers to this species are frequent on the shores of lakes and ponds in Vermont; Stuckey (1966) says that it grows in association with Rorippa islandica var. hispida along moist sandy lake-shores in Cheboygan County, Michigan, and is "abundant, usually more than 10 plants and covering a large portion of the site, usually extending beyond the meter limits" in an area where wind and water erosion has exposed the soil. Voss (1965, 1967, 1972) found it growing on moist sandy or sandy-mucky lake shores with many rushes (Juncus), many St. Johnsworts (Hypericum), Utricularia cornuta, and Littorella americana. The last-mentioned plant exhibits similar leaf-rosettes, but lacks the characteristic septate aspect. In fact, he says, the cross-markings in the roots of this pipewort distinguish it at once "from all other submerged rosette-formers". He found it in Schoolcraft and Vilas Counties, Michigan, and describes the plant as growing "On wet sandy or boggy shores or in shallow water, the heads usually emerged (on scapes at least to 40 cm long in water, only a few cm long on land); especially characteristic of soft-water and acid lakes, where the rosettes of distinctive leaves and cross-hatched roots may form a dense turf even in deep water (3 to 4 feet or more). [It is] The most common and widespread rosette-former of such lakes [in Michigan], although locally outnumbered by Isoetes spp., Littorella uniflora, Juncus pelocarpus f. submersus, Lobelia dortmanna, or other associates."

Scoggan (1950) gives the distribution of this plant as "Shallow water of lakes (Lac Pérot, Matane co.; Lac des Sept Îles, Cha.; Sayabec). (Boreal-) temperate eastern American: Minn. to Mingan Is. and Nfld., southw. to Ind. and N. C.; relic in western Scotland and Ireland."

Recent collectors have found it growing in quiet pools along rivers, in ponds, in shallow water forming floating Sphagnum mats, in shallow water along shores, on "drying mucky" lake shores, on boggy shores, in "shallow pools in bog-barrens", on the margins of ponds among the sandstone and arenaceous slate hills on Newfoundland, on "exsiccated shores", in boggy pond margins, on wet gravelly shores, in flowing water, on sandy and muddy tidal flats, in the swampy edges of freshwater ponds, "common on floating bogs" in Labrador, on sandy and peaty pond

margins, in "mud and water", in swamps and boggy marshes, and in shallow water generally. Hotchkiss & Koehler refer to it as "abundant on soft muddy sand in very shallow water" and "common on soft muck" in Wisconsin and "with Nymphozanthus in 1 1/2 feet of water over sandy bottoms". Other collectors report finding it in water 1 to 6 feet deep -- Vasey collected specimens with scapes 84 cm. long in water 3--6 feet deep. Iltis and his associates found it "in very dense cover of aquatic plants in shallow water over marly muck, with Potamogeton, Myriophyllum tenellum, etc." and "in very extensive swinging sedge mat (no Sphagnum) with Carex spp., Mariscus, Rynchospora alba, Drosera intermedia, Utricularia cornuta, Nuphar, and Nymphaea" in Wisconsin, while Kral, in New Jersey, found it growing on "peaty banks and in shallow water at edge of pond in Chamaecyparis area" [white-cedar swamps].

Besides the months previously recorded by me in these notes, the species has been collected in anthesis in June and the flower heads are uniformly described as "white", the scapes sometimes as "stiffish" [when not under water], and the leaves as dark-green in color.

Swift (1941) gives us a picturesque description of this plant: "Under the pickerel weed and Labrador tea, fly honeysuckle and pitcher plants, grows the delicate, queer little water-bog dweller pipewort, Eriocaulon articulatum, like tiny lead-white golf balls on the end of sticks. They look like little war clubs, three inches to a foot tall. These, the fisher-wives say, are batons, witches' wands, carried by the pirate folk to cast spells over the bog-trotters, being made of the skulls of honest sailor men the pirates made to walk the plank."

Howes (1974) records the common name "duck grass" for this plant -- not to be confused with "duckweed" applied to Lemna. Sharma (1972) reports the chromosome counts of 32 and 48, but in this he actually is reporting the counts for E. pellucidum and its European counterpart, E. aquaticum (J. Hill) Druce.

The Killip 13295, P. C. Standley 15, 12552, 12585, & 12821, and Van Sickle s.n. [Landisville, Aug. 10, 1890], distributed as E. pellucidum, are all actually E. compressum Lam.; Canby s.n. [Pine barrens] and Drushel 8358 are E. decangulare L.; Cory 56611, Coville s.n. [Holmead's Swamp, Sept. 29, 1889], Olds s.n. [Old Powder Mill Swamp, Sept. 1893], and P. C. Standley 11756 are E. decangulare f. parviceps Moldenke; Biltmore Herb. 3865 & 3865a and R. M. Harper 22 & 223 are E. lineare Small; and Canby s.n. [Sept. 8, 1887], Heller & Halbach s.n. [September 12, 1891], Radford 44454, Shreve & Jones 1204, Shull 69, Steele s.n. [Aug. 28, 1896], and L. F. Ward 113, s.n. [Virginia, 1873], s.n. [Near Custis Spring, Sept. 29, 1878], and s.n. [Sept. 10, 1882] are E. parkeri B. L. Robinson

Additional citations: LABRADOR: Gillett & Findlay 5471 (W-2232864). NEWFOUNDLAND: Fernald, Long, & Fogg 1476 (W-2050242);

Fernald & Wiegand 5068 (W--897807); Robinson & Schrenk 112 (W--217138, W--937189), s.n. [12 Aug. 1894] (W--217203, W--937190); Rouleau 2508 (W--2130194), 5947 (W). NOVA SCOTIA: Digby Co.: Fernald & Long 20594 (W--1104229). Guysborough Co.: Fowler s.n. [Aug. 3, 1901] (W--430715, W--605650); C. A. Hamilton 25149 (W--390372). Halifax Co.: Scoggan 13873 (Ca--M150905, N). Lunenburg Co.: Fernald & Long 23574 (W--2050716). Pictou Co.: H. Saint John 1403 (W--644846). Shelburne Co.: Fernald & Long 23567 (W--2050715, W--2050786), 23577 (W--2050717). Yarmouth Co.: Fernald, Bissell, Graves, Long, & Linder 20597 (W--1104230). Cape Sable Island: H. Saint John 1168 (W--1104093). Madame Island: Rousseau 35579 [Nat'l. Herb. Canada 130088] (W--1654196). Saint Paul Island: Perry & Roscoe 127 (W--1620404). NEW BRUNSWICK: Saint John Co.: Fowler s.n. [July 21, 1875] (W--481776), s.n. [St. Johns, 1881] (W--45299). QUEBEC: Argenteuil Co.: Marie-Victorin, Rolland-Germain, Raymond, & Boivin 56488 (W--1948539); Rolland-Germain s.n. [August 21, 1946] (W--2328130). Carleton Co.: Macoun 1507 (W--284704). Montcalm Co.: C. V. Morton 10971 (W--2329026), 11008 (W--2329052); Rousseau & Goudreault 151 (W--2231771). Saguenay Co.: Cinq-Mars, Rousseau, & Bonneau 63-886 (Ca--M307180). Wolfe Co.: Blais, Deshaies, & Forest 10729 (Ca--1358441). ONTARIO: Algoma Dist.: Taylor, Hosie, Fitzpatrick, Losee, & Leslie 1339 (W--1788944). Frontenac Co.: Garwood, Beschel, & al. 2608 (Ca--1359734). Parry Sound Dist.: Moseley s.n. [Aug. 24, 1909] (W--752662). Renfrew Co.: Umbach s.n. [Bonnie Chere Mts., July 22, 1899] (W--382991). Muskoka Dist.: Seaman s.n. [Port Stanfield, 1-9-1889] (W--787755). Nipissing Dist.: W. R. Watson 6690 (W--1669335). Thunder Bay Dist.: Calder 1749 (W--2131532). Bis Island: E. D. McDonald Jr. 313 (W--1924549). MAINE: Aroostook Co.: Kimball s.n. [Hurd Lake, 9 Aug. 1901] (W--412989). Cumberland Co.: J. Blake 660 (W--2588806); Kendall s.n. [Tinney River, July 11, 1899] (W--343981, W--343982). Franklin Co.: Fellows 6811 (W--735937). Knox Co.: Fellows 5772 (W--982233). Oxford Co.: F. W. Johnson 125 (W--1621618). Penobscot Co.: Fernald 362 (W--278448), s.n. [Orono, 8-18-1890] (W--414496). Piscataquis Co.: Hermann 19124 (W--2413839). Mount Desert Island: McAtee 3201b (W--1467302), 3203 (W--1467305). NEW HAMPSHIRE: Belknap Co.: W. F. Wright 287 (W--671618). Carroll Co.: M. A. Day s.n. [Aug. 15, 1904] (W--647837). Cheshire Co.: Batchelder s.n. [Richmond, Sept. 3, 1916] (W--1071372). Pittsburg Co.: Kendall, Goldsborough, & Doolittle 99 (W--591915). Sullivan Co.: Standley & Kilip 7682 (W--1117038). VERMONT: Caledonia Co.: A. F. Stevens s.n. [Peacham, 1892] (W--309080). Chittenden Co.: S. F. Blake 2572 (W--1204003). Rutland Co.: Drushel 10037 (W--1688971). MASSACHUSETTS: Barnstable Co.: Fernald & Fogg 567 (W--1885739);

Fernald & Long 16512 (W--1223366). Hampden Co.: Pillsbury s.n. [Springfield, 30.8.1878] (W--1119469). Norfolk Co.: S. F. Blake 4408 (W--1204154); Mohr & Faxon s.n. [Sept. 15, 1895] (W--784509). Plymouth Co.: McAtee 1043 (W--588731). Suffolk Co.: Herb. Wellesley Coll. s.n. [Wellesley, July 7, 1893] (W--270814). Worcester Co.: Allard 19510 (W--2008872). Martha's Vineyard: Fogg 2809 (W--1492395); F. C. Seymour 1139 (W--1103886). CONNECTICUT: New Haven Co.: Harger 3000 (W--2509829). Tolland Co.: N. L. Britton s.n. [Mansfield] (W--309075). County undetermined: Averill s.n. [Conn.] (W--45290). NEW YORK: Albany Co.: L. F. Ward 112 (W--937191), s.n. [Albany Lake, Aug. 18, 1879] (W--152103). Cayuga Co.: Coville s.n. [June 30, 1887] (W--295739). Chenango Co.: Coville s.n. [McDonough, July 27, 1886] (W--295740). Essex Co.: Killip 12590 (W--1285485), 12745 (W--1285551). Herkimer Co.: Coville s.n. [Oct. 8, 1890] (W--45293). Nassau Co.: P. Wilson s.n. [Merrick, Sept. 11, 1915] (Kh). Oneida Co.: Haberer 2739 (W--1200260); Rowlee s.n. [Crooks Lake, Sept. 5, 1906] (W--605103). Oswego Co.: Clausen & Hinkley 4383 (W--1814862); Fernald, Wiegand, & Eames 14204 (W--2050894). Saint Lawrence Co.: Muenschner & Clausen 3863 (W--1633536); O. P. Phelps 296 (W--644628). Suffolk Co.: Muenschner & Curtis 6811 (W--1732058). Sullivan Co.: Mearns 133 (W--648010). Warren Co.: D. S. Carpenter s.n. [July 29, 1933] (Ca--1332108); G. W. Clinton s.n. (W--784517); Vasey s.n. [Lake George, Sept. 1882] (W--784518), s.n. [Lake George, 1882] (W--45297), s.n. [Lake George] (W--45291, W--45298). Westchester Co.: Pollard s.n. [near Lake Waccabuc, August 12, 1894] (W--309082). NEW JERSEY: Atlantic Co.: Standley & Killip 7605 (W--1220018). Cumberland Co.: R. Kral 22590 (Ca--M306581, W--2470380). Hudson Co.: Van Sickle s.n. [Secaucus, July 9, 1894] (W--309081). Ocean Co.: A. Brown s.n. [Manchester, June 5, '76] (W--937193); Gleason, Smith, & Alexander 173 (W--1621765); Hollick s.n. [Tom's River, Aug. 15, 1885] (W--309074); Leonard & Leonard 6432 (W--2160334); Moldenke & Moldenke 28550 (Ac, Ca, E, Gz, Kh, Ld, Tu); A. B. Rich s.n. [Tom's River, May 30, 1887] (W--78755). Passaic Co.: Van Sickle s.n. [Green Pond, Aug. 1, 1894] (W--242227). Sussex Co.: J. K. Small s.n. [Budd's Lake, August 12-14, 1890] (W--298339). County undetermined: W. M. Canby s.n. [Pine barrens] (W--45268); A. Gray s.n. [N. J.] (W--45300). PENNSYLVANIA: Lackawanna Co.: Topping s.n. [Mud Pond, Aug. 1, '97] (W--298142). Luzerne Co.: Heller & Halbach 691 (W--45296). Pike Co.: T. C. Porter s.n. [XII Mile Pond, Aug. 18, 1870] (W--45302). DELAWARE: New Castle Co.: Chickering s.n. [Townsend, July 11, 1873] (W--2588396). MARYLAND: Anne Arundel Co.: Hotchkiss 7301 (W--2005772). Wicomico Co.: J. H. Holmes 165 (W--45292). VIRGINIA: Fairfax Co.: Harger

3001 (W-2509830). NORTH CAROLINA: Craven Co.: W. H. Brown 66 (W-51906). INDIANA: Marshall Co.: H. W. Clark 2 (W-645144). Starke Co.: Evermann 1017 (W-357850). MICHIGAN: Cass Co.: Gates & Pepoon 858 (W-648949). Cheboygan Co.: H. C. Beardslee s.n. [July 1890] (W-517578); Cutler s.n. [Aug. 27, 1937] (W-1726536); F. C. Gates 11119 (Gz); Swallen s.n. [Douglas Lake, June, July 1924] (W-1437108), s.n. [Douglas Lake, July 1924] (W-1631153). Marquette Co.: Dachnowski-Stokes s.n. [Aug. 21, 1906] (W-1728327); C. K. Dodge s.n. [Sept. 2, 1916] (W-1073131); Metcalf 2172 (W-1289298). Mason Co.: Chaney 67 (W-752931). Presque Isle Co.: F. J. Hermann 7012 (W-1632757). WISCONSIN: Marquette Co.: Iltis, Bell, Melchert, Patman, & Witt 12548 (Ca-M150064). Oconto Co.: Hotchkiss & Koehler 4327 (W-1432187). Polk Co.: Hotchkiss & Koehler 4489 (W-1434365). Shawano Co.: Hotchkiss & Koehler 4312 (W-1432179). Waupaca Co.: Hotchkiss & Martin 4436 (W-1434338); H. H. Iltis 13379 (Ca-M150065). MINNESOTA: Chisago Co.: B. C. Taylor s.n. [Aug. 1892] (W-45288). Cook Co.: Butters & Buell 474 (W-1580306). Lake Co.: Kutichek 163 (W-1327841); E. P. Metcalf 1518 (W-1327934). Morrison Co.: Sandberg 887 (W-45289). Saint Louis Co.: Moyle 2456 (W-1725248). County undetermined: F. F. Wood s.n. [Lake Seigamagah, July 20, 1891] (W-45289). LOCALITY OF COLLECTION UNDETERMINED: Beauchamp s.n. [July 23, '85] (W-152102). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 540. 1841 (W).

ERIOCAULON PERPLEXUM Satake & Hara

Additional bibliography: Okuyama, Journ. Jap. Bot. 47: 126. 1972; Moldenke, Phytologia 24: 491. 1972.

ERIOCAULON PLUMALE N. E. Br.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 251, & 252. 1901; Moldenke, Phytologia 26: 462. 1973.

Brown (1901) cites only the type collection, Heudelot 148, from Senegambia, and comments that "This species is well marked by the very different form of the sepals in the male and female flowers, and by the somewhat plumose appearance of the ultimately oblong heads, due to the protruding odd petal of the male flowers. It is allied to the following species [E. senegalense N. E. Br.], but besides the differences noted thereunder, the much shorter, terete, 5-6-ribbed (not acutely angular) peduncles will at once distinguish it."

ERIOCAULON POLYCEPHALUM Hook. f.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Saxena, Bull. Bot. Surv. India 12: 62. 1970; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke,

Phytologia 26: 32 & 34. 1973.

Saxena (1970) found this species "Occasional in marshy places", flowering in September, and cites Saxena 2972 from Madhya Pradesh, India.

ERIOCAULON PULCHELLUM Körn.

Additional & emended bibliography: Durand & Schinz, *Consp. Fl. Afr.* 5: 503. 1894; M. E. Br. in *Thiselt.-Dyer, Fl. Trop. Afr.* 8: 232 & 237. 1901; Moldenke, *Phytologia* 26: 462. 1973.

Brown (1901) cites only the type collection, Afzelius s.n., from Sierra Leone, and comments that "I cannot, from the description given, distinguish E. pumilum from E. pulchellum; the only differences assigned are, that the bracts of E. pumilum are slightly larger, and the involucre bracts slightly narrower and longer than in E. pulchellum, and are acute instead of obtuse. The two supposed species were mixed in Afzelius' herbarium. I have only seen E. pulchellum, a small and very distinct species."

ERIOCAULON PUMILIO Hook. f.

Additional bibliography: Wangerin in *Just, Bot. Jahresber.* 51 (1): 169 [135]. 1929; Fedde in *Just, Bot. Jahresber.* 51 (2): 296. 1933; Moldenke, *Phytologia* 24: 494. 1972.

ERIOCAULON PYGMAEUM Soland.

Additional bibliography: Beard, *West Austr. Pl.*, ed. 2, 25. 1970; Moldenke, *Phytologia* 24: 494. 1972.

ERIOCAULON QUINQUANGULARE L.

Additional synonymy: Eriocaulon quinquangulare L. ex Saxena, *Bull. Bot. Surv. India* 12: 62, sphalm. 1970.

Additional bibliography: Mart., *Erioc. Selbst. Pflanzenfam.* 24 & 29. 1833; Durand & Schinz, *Consp. Fl. Afr.* 5: 503. 1894; N. E. Br. in *Thiselt.-Dyer, Fl. Trop. Afr.* 8: 259. 1901; Wangerin in *Just, Bot. Jahresber.* 51 (1): 169 [135] (1929) and 50 (1): 231--232. 1930; Alston in *Trimen, Handb. Fl. Ceylon* 6: 304 & 306. 1931; Fedde in *Just, Bot. Jahresber.* 51 (2): 296. 1933; Abeywickrama, *Ceylon Journ. Sci. Biol.* 2: 140. 1959; Gunawardena, *Gen. & Sp. Pl. Zeyl.* 207. 1968; Beard, *West Austr. Pl.*, ed. 2, 25. 1970; Matthew, *Bull. Bot. Surv. India* 12: 91. 1970; Saxena, *Bull. Bot. Surv. India* 12: 62. 1970; Fonseka & Vinasithamby, *Prov. List Local Names Flow. Pl. Ceylon* 29. 1971; R. R. Rao, *Stud. Flow. Pl. Mysore Dist.* 2: 875--876 [thesis]. 1973; Moldenke, *Phytologia* 26: 183 (1973), 28: 101, 445, 456, & 466 (1974), and 29: 86 & 88. 1974.

Matthew (1970) describes this species as "Herbs larger than E. cinereum but less numerous though more widely distributed", while Saxena (1970) refers to it as "Common in marshy places" in Madhya Pradesh, India, flowering in September, and cites Saxena 3578. Fosberg and his associates found the plant to be "very abundant in open wet sandy soil between patches of woods" in Sri Lanka and describes the flower-heads as "dull whitish". They encountered it

in flower in December. My wife and I found it growing in tremendous almost pure stand colonies in moist limestone areas along roadsides in Walpattu National Park, Sri Lanka, the colonies sometimes extending as far as the eye could reach and also extremely abundant in wet sandy ground, the inflorescence-heads decidedly gray in all stages of maturation in January at about 400 feet altitude. Cramer describes it as "Common and abundant along open borders of villu; heads snowy-white, to 6 mm. in diameter, sweet-scented."

Gunawardena (1968) records the vernacular Sinhalese name, "hin-kok-mota", for this species, while Fonseka & Vinasithanby (1971) record "heen-kokmettu".

Thwaites (1839) refers to his var. argenteum (Mart.) Thwaites, for which he cites C.P. 792, as abundant on rice paddy borders. Amaratunga calls the plant "hin komota". Recent collectors have found it growing on rocks, in moist grassy patches, and in drying up paddy fields "rich in annuals", and describe the plant as forming rosettes, the leaves erect, and the flowering inflorescences white, whitish, or gray. They have collected it at altitudes of 30--192 meters, flowering and fruiting from February to May, July, and September to November. Mueller-Dombois says that it was "locally abundant and dominant in moist sand on lake shores", while Koyama speaks of it as "locally abundant in wet sand around tree islands in periodically flooded pond margins" in Sri Lanka. Herper & Jayasuriya collected it "in [a] peculiar sandy flush with open sparse vegetation of Utricularia and Kyris, calling it a "small tufted herb" with the "leaf-bases bright pink".

The three Cooray collections cited below are all voucher specimens for ecologic observations. Thwaites C.P. 792 is a mixture with E. setaceum var. capillus-naiadis (Hook. f.) Moldenke, while T. Thomson s.n. [Plan. Ganget. Inf.] is a mixture with E. stellulatum Korn.

Durand & Schinz (1894) record E. quinquangulare from Réunion.

Material has been misidentified and distributed in some herbaria as E. luzulaefolium Mart. On the other hand, the Collector undetermined s.n. [Narainhetty], distributed as E. quinquangulare, is actually E. alpestre Hook. f. & Thoms., Collector undetermined s.n. [Dambulla Rock, 20 Dec. 1881] and Cramer 3160 are E. cinereum R. Br., and Mueller-Dombois & Cooray 68012817 and School teacher s.n. [6-4-1905] are E. walkeri Hook. f.

Additional citations: INDIA: State undetermined: T. Thomson s.n. [Plan. Ganget. Inf.] (Pd). SRI LANKA: Alston 1000 (Pd); Alwis s.n. [Tebuwana, Nov. 1920] (Pd); Amaratunga 2139 (Pd); Collector undetermined s.n. [Dolosbagie, April 1882] (Pd), s.n. [Galagedera, Oct. 1882] (Pd), s.n. [Lenadore, Feb. 1893] (Pd), s.n. [Pinnawala, Balangoda] (Pd); Cooray 70020104 R (Pd), 70020245 R (Pd), 70032207 R (Pd); L. H. Cramer 3168 (W-2760754); Fosberg, Mueller-Dombois, Wirawan, Cooray, & Balakrishnan 50710 (W-2676585); G.

Gardner O.C. 931 [Thwaites C.P. 792, in part] (Pd); Hepper & Jayasuriya 4622 (W--2720106); Hepper & Silva 4729 (Pd, W--2720040); T. Koyama 13315 (Pd); Lewis & Silva s.n. [Delgoda, 29.3.1919] (Pd); Moldenke, Moldenke, & Jayasinghe 28322 (Ac, E, Gz, Kh, Ld, Pd, Tu); Moldenke, Moldenke, & Jayasuriya 28217 (Ac, E, Gz, Kh, Ld, Pd, Tu); 28225 (Ac, E, Gz, Kh, Ld, Pd, Tu); Moldenke, Moldenke, & Sumithraarachchi 28199 (Ac, E, Gz, Kh, Ld, Pd, Tu); Mueller-Dombois 67051833 (Pd); Thwaites C.P. 792, in part (Pd); Trimen s. n. [Hemeratgoda] (Pd); L. C. Wheeler 12078 (Pd)

ERIOCAULON QUINQUANGULARE var. ELATIUS Moldenke, *Phytologia* 28: 466. 1974.

Bibliography: Moldenke, *Phytologia* 28: 445 & 466. 1974.

Citations: SRI LANKA: Moldenke, Moldenke, Sumithraarachchi, & Waas 28312 (Ac--isotype, Gz--isotype, Kh--isotype, Ld--isotype, Pd--isotype, Z--type).

ERIOCAULON QUINQUANGULARE var. MARTIANUM Wall.

Synonymy: Eriocaulon quinquangulare f. viviparum Moldenke, *Phytologia* 28: 101. 1974.

Additional bibliography: Moldenke, *Phytologia* 24: 495 (1972), 25: 239 (1973), and 28: 101, 445, 446, & 456. 1974.

The f. viviparum, with its proliferating heads, is based on Trimen s.n. from Heneratgoda, Colombo District, Western Province, Sri Lanka, collected in May of 1896 and deposited in the herbarium of the Royal Botanic Garden at Peradeniya. It seems, however, that Wallich's earlier var. martianum was established on a plant with similarly proliferating heads and it is most probable that the two taxa are identical.

Citations: SRI LANKA: Trimen s.n. [Heneratgoda, May 1896] (Pd).

ERIOCAULON RAVENELII Chapm.

Additional bibliography: Moldenke, *Phytologia* 26: 34--35 (1973) and 28: 428. 1974.

Additional citations: FLORIDA: Dade Co.: Small & Carter s.n. [January 14, 1909] (W--1738971). Lee Co.: Francis 64 (W--1036542); Herb. Chapman s.n. [Caloosahatchie] (W--45285); R. Kral 22923 (W--2470425). Levy Co.: R. Kral 22940 (W--2470415). Martin Co.: Godfrey 65625 (W--2604039). County undetermined: Chapman s.n. (W--45286); Herb. Chapman 550 (W--937186), 3866 (W--955019).

ERIOCAULON REITZII Moldenke & Smith

Additional bibliography: Moldenke, *Biol. Abstr.* 56: 3000. 1973; Moldenke, *Phytologia* 26: 29 & 35. 1973.

ERIOCAULON RITCHIEANUM Ruhl.

Additional bibliography: Wangerin in *Just, Bot. Jahresber.* 51

(1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Saxena, Bull. Bot. Surv. India 12: 62. 1970; Bole, Excerpt. Bot. A.20: 83. 1972; Moldenke, Phytologia 24: 496 (1972) and 28: 444. 1974.

Saxena (1970) refers to this species as "Rare" on riverbanks, "partly in water", flowering in November, and cites Indokar 10961 from Madhya Pradesh, India.

ERIOCAULON ROBUSTO-BROWNIANUM Ruhl.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 305. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1963; Sharma, Nucleus 15: Append. 10. 1972; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 376 [thesis]. 1973; Moldenke, Phytologia 26: 32 & 35 (1973), 28: 445 (1974), and 29: 85. 1974; Hocking, Excerpt. Bot. A.23: 292. 1974.

Recent collectors have found this plant growing in pastures and on rocks along creeks inside rainforests, at altitudes of 1500--3000 feet, flowering and fruiting (in addition to months previously reported by me) in February, the flower-heads described as white. Nain describes the plant as a "robust tufted herb". Sharma (1972) reports the chromosome number as "c 110".

Additional citations: INDIA: Gujarat: Nain s.n. [7-9-1971] (Ac, Z). SRI LANKA: Hoogland 11448 (Pd); Thwaites C. P. 220, in part (Pd), 933 (Pd), 3382 (Pd, Pd); Trimen's collector s.n. [Dotalu Oya, 28.IX.85] (Pd).

ERIOCAULON ROBUSTUM Steud.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 & 170 [135 & 136]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 26: 35--36. 1973.

ERIOCAULON ROSEUM Fyson

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 25: 69. 1972.

ERIOCAULON ROSULATUM Körn.

Additional bibliography: Moldenke, Phytologia 25: 69. 1972.

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 61 III. 1863 (N, Z).

ERIOCAULON SCARIOSUM J. E. Sm.

Additional bibliography: Sharma, Nucleus 15: Append. 10. 1972; Moldenke, Phytologia 26: 463. 1973.

Sharma (1972) reports the chromosome number for this species as 64.

ERIOCAULON SCHIMPERI Körn.

Additional & emended bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; N. E. Br. in Thiselet.-Dyer, Fl. Trop. Afr. 8: 235 & 243--244. 1901; Moldenke, Phytologia 26: 463. 1973.

Brown (1901) cites only Schimper 1217, the type, from "in a swamp at Jan Meda, 8500 ft." in Ethiopia.

Additional citations: BURUNDI: Lewalle 2337 (Gz).

ERIOCAULON SCHIPPII Standl.

Additional bibliography: Rouleau, Taxon Index Vol. 1-20, part 1: 139. 1972; Moldenke, Phytologia 25: 71. 1972.

ERIOCAULON SCHLECHTERI Ruhl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232--234 & 255. 1901; Moldenke, Phytologia 25: 71 (1972) and 28: 442 & 443. 1974.

Brown (1901) cites only the type, Schlechter 12093, from "in a swamp at Inhambane", Mozambique, and comments that "The above locality is just south of the Tropic of Capricorn, but doubtless the plant occurs within the Tropical area. I have not seen it." Simon & Williamson describe it as "dominant on [the] wet rocky zone under constant spray", at an altitude of 4200 feet, in Zambia, flowering there in October.

Additional citations: ZAMBIA: Simon & Williamson 1127 (E--2008719).

ERIOCAULON SCHUCHIANUM Hand.-Mazz.

Additional bibliography: Hand.-Mazz. in Engl., Bot. Jahrb. 56: 585. 1921; Fedde & Schust. in Just, Bot. Jahresber. 48 (1): 330. 1927; Wangerin in Just, Bot. Jahresber. 50 (1): 89. 1929; Moldenke, Phytologia 25: 71. 1972.

ERIOCAULON SEDGWICKII Fyson

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 25: 72. 1972.

ERIOCAULON SEEMANNII Moldenke

Additional bibliography: Moldenke, Phytologia 26: 36. 1973.

Additional citations: NICARAGUA: Cabo Gracias a Dios: F. C. Seymour 3677 (N).

ERIOCAULON SELLOWIANUM Kunth

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157, map 1776, & Ind. 12. 1972; Anon., Biol. Abstr. 56 (6): B.A.S.I.C. S.88. 1973; Moldenke, Biol. Abstr. 56: 3007. 1973; Moldenke, Phytologia 26: 463--464 (1973) and 28: 438. 1974.

Anderson found this plant growing on "seeping hillside in area of rocky sandstone hilltop cerrado, seeping hillsides, rocky open cerrado in raised places on hillside, and open mesophytic woods by stream".

The Hatschbach 24546 & 26306 and the Smith & Klein 13632, previously cited by me as typical E. sellowianum, are actually var. paranense (Moldenke) Moldenke & Smith.

Additional citations: BRAZIL: Goiás: W. R. Anderson 6466 (Ld); Irwin & Soderstrom 7643 (S). Mato Grosso: Hatschbach & Koczicki 33255 (Ld); Ratter, Santos, Souza, & Ferreira R.1592 (N). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 61 II. 1863 (N, Z).

ERIOCAULON SELLOWIANUM var. LONGIFOLIUM Moldenke

Additional bibliography: Moldenke, Phytologia 26: 463. 1973.

This variety has been encountered in sandy wet soil on campos. The Dombrowski collection cited below was previously erroneously cited by me as var. paranense (Moldenke) Moldenke & Smith.

Additional citations: BRAZIL: Paraná: Dombrowski 82 [Hert. Inst. Hist. Nat. 6793] (Ld).

ERIOCAULON SELLOWIANUM var. MINOR Moldenke

Additional bibliography: Moldenke, Phytologia 26: 463 (1973) and 28: 438. 1974.

ERIOCAULON SELLOWIANUM var. PARANENSE (Moldenke) Moldenke & Smith

Additional synonymy: Eriocaulon sellowianum var. paranaense (Mold.) Mold. & Smith, in herb.

Additional bibliography: Anon., Biol. Abstr. 56 (6): B.A.S.I.C. S.88. 1973; Moldenke, Biol. Abstr. 56: 3007. 1973; Moldenke, Phytologia 26: 464 (1973) and 28: 438. 1974.

Reitz & Klein describe this plant as an "erva, flôr branca" and encountered it in "benhado do campo". The Smith & Klein 13632, cited below, was previously erroneously cited by me as typical E. sellowianum Kunth. On the other hand, the Dombrowski 82, previously cited as var. paranense, is actually var. longifolium Moldenke.

Additional citations: BRAZIL: Mato Grosso: Hatschbach 24546 (S). Paraná: Hatschbach 26306 (S), 30992 (W--2706692). Santa Catarina: Reitz & Klein 16400 (Ld); Smith & Klein 13632 (Ac).

ERIOCAULON SENEGALENSE N. E. Br.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233 & 251--252. 1901; Moldenke, Phytologia 25: 73. 1972.

Brown (1901) cites only the type collection, Heudelot 680, from Sénégal, and comments that "This is closely allied to E. plumale, N. E. Br., differing in its fewer and much longer peduncles (which are out of all proportion to the small size of the rosette of leaves), in the entirely straw-coloured flowering-bracts and sepals of the female flowers and rather stouter sepals of the male flowers. The outer flowers of the head are all male, with very long stipes between the sepals and the petals, then come several series of female flowers, and the centre occupied with males which have scarcely any stipes, but the stipes may grow out later, as the only head examined was rather young. This and E. plumale are

remarkably distinct from all the other African species in the very great difference in the form of the sepals of the male and female flowers, and in the disparity in the number of sepals and petals, for in all the female flowers I have examined I constantly found 2 sepals and 3 petals present: occasionally, but rather rarely, a third sepal is present in the male flowers."

ERIOCAULON SENILE Honda

Additional & emended bibliography: Ikuse, Pollen Grains Jap. 46. 1956; Satake, Journ. Jap. Bot. 46: 372 [20]. 1971; Moldenke, Phytologia 26: 38. 1973.

ERIOCAULON SETACEUM L.

Additional bibliography: Wikstr., K. Svensk. Vet. Akad. Handl. Stockh., ser. 2, 1: 79. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. (repr.) 14. 1821; J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 278. 1883; Anon., Journ. Linn. Soc. Lond. Bot. 20: 522. 1884; Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 240. 1901; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Beard, West Austr. Pl., ed. 2, 25. 1970; Fonseka & Vinasithamby, Prov. List Local Names Flow. Pl. Ceylon 70. 1971; Satake, Journ. Jap. Bot. 46: 372 [20]. 1971; Moldenke, Phytologia 26: 464 (1973), 28: 101, 445, & 456 (1974), and 29: 85 & 94. 1974.

The vernacular names, "kok-mota", "pedakokmota", and "penda", are recorded for this plant in Ceylon. In Thailand it has been found growing at altitudes as low as 50 m. Thwaites (1839) considered E. intermedium Körn. as a synonym of E. setaceum L., citing his C. P. "791 (794)". Alston (1931) asserts that "E. setaceum Hook. f." [not L.] is a synonym of E. intermedium. The C. P. 791 collection, as seen by me in the herbaria at Peradeniya and Berlin, while labeled as E. intermedium, is actually a mixture of E. setaceum L. and E. setaceum var. capillus-naiadis (Hook. f.) Moldenke. Some authors in the past (e.g., Fyson, 1921, Abeywickrama, 1959, Moldenke, 1970, Fonseka & Vinasithamby, 1971) have regarded E. capillus-naiadis Hook. f. as synonymous with E. setaceum L., but I am now regarding it as a variety of it. In true E. setaceum the flowering-heads are 3--4 mm. in diameter and black, while in var. capillus-naiadis they are grayish-white, grayish, or gray and only 2--3 mm. in diameter. The two taxa have been widely confused in herbaria.

The following names, previously cited by me as synonyms of E. setaceum, must now be deleted from its synonymy and shifted to that of var. capillus-naiadis: Eriocaulon capillus-naiadis Hook. f., E. capillus najadis Hook. f., E. capillus-naidis Hook. f., E. setaceum f. capillus-naiadis Haines, and E. setaceum f. capillis-naiadis Haines.

The S. Y. Hu 8737, distributed as E. setaceum, is actually E. fluviatile Trimen, while S. Y. Hu 8111 is E. truncatum Hamilt.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia, 6000 ped.] (Pd). SRI LANKA: Collector undetermined s.n. [near Pelawatte, March 1887] (Pd); Thwaites C.P. 791, in part (B, B, Pd); Trimen s.n. [Hewesse, Feb. 1886] (Pd). BURMA: Tenasserim: Helper 5569 (Pd). THAILAND: Larsen, Larsen, Nielsen, & Sanisuk 32281 (Ac).

ERIOCAULON SETACEUM var. CAPILLUS-NAIADIS (Hook. f.) Moldenke, Phytologia 28: 101. 1974.

Synonymy: Eriocaulon capillus-naiadis Hook. f., Fl. Brit. India 6: 572 & 769. 1893. Eriocaulon capillus najadis Hook. f. apud Ruhl. in Engl., Pflanzenreich 14 (4-30): 89 & 285. 1903. Eriocaulon capillus-naidis Hook. f. apud Fyson, Journ. Indian Bot. 2: 193, in syn. 1921. Eriocaulon setaceum f. capillus-naiadis Haines, Bot. Bihar & Orissa 1067. 1924. Eriocaulon setaceum f. capillis-naiadis Haines ex Moldenke, Résumé Suppl. 17: 11, in syn. 1968. Eriocaulon capillus-naidus Hook. f. ex Moldenke, Fifth Summ. 496, in syn. 1971. Eriocaulon capillus-najadis Hook. f. ex Moldenke, Fifth Summ. 496, in syn. 1971.

Bibliography: Hook. f., Fl. Brit. India 6: 572 & 769. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 89 & 285. 1903; Prain, Bengal Pl., ed. 1, 1127. 1903; Fyson, Journ. Indian Bot. 2: 193. 1921; Haines, Bot. Bihar & Orissa 1067. 1924; Alston in Trimen, Handb. Fl. Ceylon 6: 303. 1931; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 33. 1946; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé 286. 1959; Prain, Bengal Pl., ed. 2, 2: 848. 1963; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Moldenke, Résumé Suppl. 17: 11. 1968; Moldenke, Phytologia 19: 234 & 236. 1970; Fonseka & Vinasithamby, Prov. List Local Names Flow. Pl. Ceylon 70. 1971; Moldenke, Fifth Summ. 2: 496. 1971; Moldenke, Phytologia 28: 101, 445, & 456 (1974) and 29: 85. 1974.

Fyson (1921), Abeywickrama (1959), Moldenke (1946, 1970, 1971), and Fonseka & Vinasithamby (1971) have regarded E. capillus-naiadis as a straight synonym of E. setaceum L. After examining specimens in the Peradeniya herbarium, I feel that they are different, albeit only of varietal rank. It is, however, very possible that E. intermedium Körn. is also a synonym of this variety. More study is required before this question can be answered definitely. The variety has its flowering-heads only 2--3 mm. wide and grayish-white, grayish, or gray in color, while in true E. setaceum they are 3--4 mm. wide and black. In fact, Alston describes the "flowers" of var. capillus-naiadis as "white". A notation on the sheet of Collector undetermined s.n. [Hewessee, Feb. 1886] in

the Peradeniya herbarium says "receptacle hairy, 1 petal larger, no glands" for a specimen of what appears to be this variety. It is most probable that the gray, grayish, grayish-white, or white appearance of its heads is due to its hairiness, whereas the black aspect of the true E. setaceum is probably due to its lack of hairs.

Thwaites C.P. 791 is a mixture of E. setaceum and the var. capillus-naiadis, while C.P. 792 is a mixture of the variety with E. quinquangulare L.

Collectors of var. capillus-naiadis state that the lower filiform submerged leaves are green, the flowering-heads only emergent above the water. They have encountered the plant along banks of irrigation canals beside rice paddy fields at sealevel and have found it to be "very common" in 10--20 cm. of water in fallow ricefields, flowering and fruiting in December and January.

Material of this variety has been misidentified and distributed in some herbaria as E. sexangulare L.

Citations: SRI LANKA: Alston 678 (Pd); Amaratunga 450 (Pd); Collector undetermined s.n. [Hewessee, Feb. 1886] (Pd); Cramer 2779 (Pd, W--2718048); W. Ferguson s.n. (Pd); F. R. Fosberg 51799 (Pd); G. Gardner s.n. [Pasdun Korale; Thwaites C.P. 792, in part] (Pd); Thwaites C.P. 791, in part (Pd).

ERIOCAULON SEXANGULARE L.

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 24, 29, & 63. 1833; A. Rich., Tent. Fl. Abyss. 2: 347. 1851; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 259. 1901; Wangerin in Just, Bot. Jahresber. 49 (1): 160 (1927) and 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931; Fedde in Just, Bot. Jahresber. 49 (2): 423 (1932) and 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 141. 1959; Lourteig, Taxon 15: 31. 1966; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; Keng, Ord. & Fam. Malay. Seed Pl. 314. 1969; Rouleau, Taxon Index Vols. 1-20 part 1: 139. 1972; Sharma, Nucleus 15: Append. 10. 1972; Altschul, Drugs & Foods 19. 1973; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 876 [thesis]. 1973; Moldenke, Phytologia 26: 19 & 38--41 (1973), 28: 445, 446, & 457 (1974), and 29: 86 & 87. 1974.

The E. sexangulare Ruhl., previously cited in the synonymy of the present species, belongs, rather, in that of E. stuhlmanni N. E. Br.

Recent collectors describe E. sexangulare as a rosette perennial, the inflorescence heads whitish, grayish-white, ashy-gray, or pale ashy-blue, and have found it on seashores, in swamps, or swampy places with Xyris in paddy marshes, along the bunds of paddy fields, or on open boggy banks of artificial lakes (tanks), in slow-moving permanent water, in wet sand along the edge of streams, "in wet areas by streams", and "common" among short grass in marshy ground, at altitudes from sealevel to 2500 feet, flowering from February to April, June to August, and October to

December, fruiting in August.

Hu, collecting in Hongkong, seems to have encountered a rather low-growing population, the plants in flower only 10--16 cm. tall, although on two labels he speaks of "tall plants" and "large plants". He found it growing in water "in a swamp formed as a spring running into the sea behind a huge rock by beach, with Pandanus behind" and "in midstream on rocks", the "bracts black with white papillae", flowering and fruiting in February, and "rare".

The vernacular name, "kok-mota", is recorded for the species in Sri Lanka in Sinhalese. Altschul (1973) cites H. H. Chung 2711 from China and records his statement that the plant is sold there in shops selling fresh medicinal plants and that it is used in Chinese native medicines. Keng (1969) calls the species the "long-leaved pipewort". Material has been misidentified and distributed in some herbaria as E. wightianum Mart. and "E. wightianum Martin". On the other hand, the Cramer 2779, distributed as E. sexangulare, is actually E. setaceum var. capillus-naiadis (Hook. f.) Moldenke

It should be noted that Thwaites (1839) cites his C.P. 220 as E. wallichianum Mart. and C.P. 795 as E. sexangulare. Thwaites C.P. 790 has broader leaves than usual, while Lewis & Silva s.n. (cited below) has one plant with broadish leaves and 3 other plants with narrow leaves on the same sheet. In view of Thwaites' notorious habit of combining plants from several localities under the same number, it is not at all certain that these plants all came from the same locality.

Additional citations: INDIA: Kerala: Herb. Wight 2858 (Pd). SRI LANKA: Alston 1068 (Pd), 1214 (Pd); Amaratunga 153 (Pd), 1047 (Pd), 1240 (Pd); Balakrishnan MBK.1157 (Pd, W--2721815); Collector undetermined s.n. [Hunnewat, June 1895] (Pd); Cramer 2712 (Pd), 2944 (Pd, W--2718095, W--2718096), 3105 (Pd); G. Gardner O.C.937 [Thwaites C.P.220, in part; Karawita Kanda, April 1833] (Pd); Hepper, Maxwell, & Fernando 4566 (Pd, W--2720114); Jayasuriya 1520, in part (Pd); Lewis & Silva s.n. [Delgoda, 24.3.1919] (Pd, Pd); Moldenke, Moldenke, & Sumithraarachchi 23316 (Ac, E, Gz, Kh, Ld, Pd, Tu); Thwaites C.P.220, in part [Kukul-korale, Dec. 1833] (Pd), C.P.220, in part [Kueunegala, July 1846] (Pd), C.P.220, in part [Ratnapura, March 1876] (Pd), C.P.790 (Pd). BURMA: Tenasserim: Falconer s.n. [Moulmein] (Pd). HONGKONG: S. Y. Hu 6503 (W--2711187), 6618 (W--2697319), 7138 (W--2697900), 8547 (W--2711170), 8569 (W--2711167), 9306 (W--2711860). HONGKONG ISLANDS: High: S. Y. Hu 8657 (W--2697718). THAILAND: Larsen, Larsen, Nielsen, & Santisuk 31091 (Ac), 32284 (Ac), 32318 (Ac). INDOCHINA: Vietnam: Squires 235 (Pd). MALAYA: Singapore: T. Anderson 189 (Pd).

ERIOCAULON SEXANGULARE f. VIVIPARUM Moldenke

Additional bibliography: Moldenke, Phytologia 25: 75 (1972) and

28: 445 & 446. 1974.

Additional citations: SRI LANKA: G. Gardner O.C.937 [Thwaites C.P.220, in part; Pasdun-Korala, Dec. 1848] (Pd, Pd).

ERIOCAULON SOLLYANUM Royle

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; Engl., Pflanzenw. Ost-Afr. C: 133. 1895; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 254. 1901; Backer, Handb. Fl. Java 3: 6--7. 1924; H. N. Ridl., Journ. Bot. 63: Suppl. 126. 1925; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135] (1929), 50 (1): 231 & 232 (1930), and 53 (2): 261. 1930; Alston in Trimen, Handb. Fl. Ceylon 6: 304 & 306. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Hamzah, Toha, & Van Steenis, Mount. Fl. Java pl. 19, fig. 1. 1972; Moldenke, Phytologia 26: 39 (1973), 28: 447 (1974), and 29: 86. 1974.

Additional illustrations: Hamzah, Toha, & Van Steenis, Mount. Fl. Java pl. 19, fig. 1 (in color). 1972.

This species was named in honor of R. H. Solly (1778--1858), a keen worker on the physiology and anatomy of plants. Gunawardena (1968) erroneously gives Solly's death date as "1758".

Hamzah, Toha, & Van Steenis (1972) record this species from Java, Sumatra, and New Guinea. They describe it as "A glabrous herb, the culms 7--35 cm. tall. Leaves 3--10 cm. long. The receptacle of the heads densely long-hairy." They comment that "In Java on the Priangan Mts (not on Mt. Gedé), on Mts Diéng & Jang (Taman Hidup), locally common, sometimes in dense tufts, in marshy places, and swinging bogs, at 1500--2000 m. Also known from SE. Asia and Sumatra (as low as 750 m), and from New Guinea." Durand & Schinz (1894) record it from Zanzibar.

ERIOCAULON SONDERIANUM Körn.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; Engl., Pflanzenw. Ost-Afr. C: 133. 1895; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 245. 1901; Moldenke, Phytologia 26: 39 (1973), 28: 443 & 457 (1974), and 29: 113. 1974.

It should be noted that the E. sonderianum of Rendle is a synonym of E. decipiens N. E. Br. Durand & Schinz (1894) record E. sonderianum Körn. from Cape Province, South Africa.

ERIOCAULON SPONGIOSIFOLIUM Alv. Silv.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157 & Ind. 12. 1972; Moldenke, Phytologia 26: 39. 1973.

ERIOCAULON STEINBACHII (Moldenke) Moldenke

Additional bibliography: R. C. Foster, Contrib. Gray Herb. 181: 39. 1958; Moldenke, Phytologia 25: 78. 1972.

ERIOCAULON STELLULATUM Körn.

Additional bibliography: Wangerin in Just, Bot. Jahrest. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahrest. 51 (2): 296. 1933; Moldenke, Phytologia 25: 78--79. 1972.

Nain describes this plant as a tufted herb, the flowering heads white, with "stellately spreading involucral bracts", and found it growing in pastures. The T. Thomson s.n. [Plan. Ganget. Inf.] collection, cited below, is a mixture with E. quinquangulare L.

Additional citations: INDIA: Gujarat: Nain s.n. [Western Ghats, 7-9-71] (Ac). State undetermined: T. Thomson s.n. [Plan. Ganget. Inf.] (Pd, Pd).

ERIOCAULON STEYERMARKII Moldenke

Additional bibliography: Moldenke, Phytologia 26: 103--104 (1973) and 28: 438. 1974.

Additional citations: BRAZIL: Goiás: Irwin, Harley, & Smith 33115 (N).

ERIOCAULON STOLONIFERUM Welw.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 234 & 241--242. 1901; Moldenke, Phytologia 26: 464. 1973.

Brown (1901) cites only the type collection, Welwitsch 2458, from "in the cold rapid mountain streams of Morro de Lopollo, 3800--5800 ft.", Huila, Angola. He comments that "According to the notes with Welwitsch's specimen, this plant forms a green carpet on the beds of the streams under the water, and rarely flowers, the heads being frequently viviparous, when their peduncles bend down and produce young plants, forming the so-called stolons. It is allied to E. Woodii, N. E. Br., from Natal."

ERIOCAULON STRIATUM Lam.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; Perrier de la Bâthie, Cat. Fl. Madag. 21. 1934; Moldenke, Phytologia 25: 80. 1972.

ERIOCAULON STUHLMANNI N. E. Br.

Additional synonymy: Eriocaulon sexangulare Ruhl. apud N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 259, in syn. 1901 [not E. sexangulare Auct. ex Cuf., 1971, nor Burm. f., 1826, nor Fyson, 1959, nor Heyne, 1832, nor L., 1753, nor Kart., 1893, nor sensu auct. Japon., 1965, nor Willd., 1841].

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232 & 259. 1901; Moldenke, Phytologia 25: 80 (1972) and 28: 457. 1974.

Brown (1901) cites only the type collection, Stuhlmann 3552, and comments that "This plant is unhesitatingly referred by Ruhland to E. sexangulare, Linn., but that species grows 12--16 in. high and the female flowers have very distinct and rather peculiar petals. I have not seen the plant, but think it possible that Ruhland made the

comparison with E. sieboldianum, Sieb. & Zucc. (E. sexangulare, Mart., not of Linn.) to which, from the description, it appears to be closely related; but I doubt its identity with that plant. The only African species with which it can be compared is E. amboense, Schinz, from which it differs (according to the characters given by Ruhland in his key to the species) by the connate sepals of the male flowers."

ERIOCAULON SUBGLAUCUM Ruhl.

Additional bibliography: Alston in Trimen, Handb. Fl. Ceylon 6: 303 & 305. 1931; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 25: 80 (1972) and 29: 86, 91, & 98. 1974.

Material of this species has been misidentified and distributed in some herbaria as E. atratum Körn. and E. subcaulescens Hook. f. The Thwaites C.P.61 collection of July 1866 is a mixture with E. atratum Körn. and E. ceylanicum Körn., so I am regarding the February portion of the assemblage as representing the type collection of E. subglaucum.

Additional citations: SRI LANKA: G. Gardner O.C.934 [Thwaites C.P.934; April] (Pd, Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28285 (Ac, Gz, Kh, Ld, Pd, Tu, Z); Thwaites C.P.61, in part [July 1866] (Pd), C.P.61, in part [February] (Pd--isotype, Pd--isotype).

ERIOCAULON SUBMERSUM Welw.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 234 & 240--241. 1901; Moldenke, Phytologia 25: 80. 1972.

Brown (1901) cites only Welwitsch 2456 & 2457, the cotypes, and comments that this species is "Allied to E. bifistulosum, Van Heurck, but differing in having acute sepals to the male flowers, with a few minute white hairs on the keel. The name of this species antedates by 7 months the E. submersum, Tate, of South Australia."

ERIOCAULON SUBULATUM N. E. Br.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233 & 255--256. 1901; Moldenke, Phytologia 26: 40. 1973.

Brown (1901) cites only the type collection, Kirk s.n., from "on an island at Victoria Falls", Zambesi River, "British Central Africa", and comments that "This is very near E. ciliisepalum, Rendle, and may be only a robust form of that species, but it differs in appearance, in its stouter subulate leaves, more numerous and stouter peduncles, larger heads, larger flowers, and the slightly different form of the sepals and petals."

ERIOCAULON SUISHAENSE Hayata

Additional synonymy: Eriocaulon suichaense Hayata apud Wangerin

in Just, Bot. Jahresber. 49 (1): 160, sphalm. 1927.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 49 (1): 160. 1927; Fedde in Just, Bot. Jahresber. 49 (2): 423. 1932; Moldenke, Phytologia 25: 81 (1972) and 28: 457. 1974.

ERIOCAULON TENUIFOLIUM Klotzsch

Additional bibliography: Moldenke, Phytologia 25: 81—82. 1972.

Additional citations: BRAZIL: Roraima: Prance, Steward, Ramos, & Farias 9177 (S).

ERIOCAULON TEUSCZII Engl. & Ruhl.

Additional & emended bibliography: N. E. Br. in Thiselt.—Dyer, Fl. Trop. Afr. 8: 235, 236, 245--246, & 249—250. 1901; Moldenke, Phytologia 26: 464. 1973.

Brown (1901) cites for E. teusczii only Mechow 231 from Malange, Angola, noting "Said to be allied to E. huillense, Engl. & Ruhland, but differing in its larger leaves and heads, pure white sepals, longer female petals and narrow equal male petals. I have not seen it." For E. lacteum he cites Johnston s.n. and Welwitsch 2452, 2452b, & 2453 from Angola, Bryce s.n. from "British Central Africa", and Thompson s.n. from Tanganyika, noting that "E. lacteum may prove to be conspecific with E. Teusczii, Engl. & Ruhl., but the description of the latter does not enable me to identify it." For E. huillense he cites only Antunes s.n., the type, from Huila, Angola, commenting that it is "Said to be allied to E. Teusczii, Engl. & Ruhland, and from description appears to be near E. Bauri, N. E. Br., from South Africa. I have not seen it, and do not understand the use of the term lanceolate as applied to the leaf, which is stated to be only 3/4 millimetre broad in the upper part. Probably the sepals are dark olive or fuscous at the apex, rather than green as described."

Robinson describes this plant as an erect annual, with the rosette leaves "more or less succulent", and found it growing at 4000 feet altitude, flowering and fruiting in June. Material has been misidentified and distributed in some herbaria as Syngonanthus poggeanus Ruhl.

Additional citations: ZAMBIA: E. A. Robinson 2266 (Mu).

ERIOCAULON THOUARSII H. Lecomte

Additional bibliography: Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Phytologia 25: 83. 1972.

Perrier de la Bâthie (1934) records this species from the east coast of Madagascar.

ERIOCAULON THUNBERGII Wikstr.

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; N. E. Br. in Thiselt.—Dyer, Fl. Trop. Afr. 8: 233 & 239. 1901; Moldenke, Phytologia 25: 83. 1972.

Brown (1901) cites only the type collection, Afzelius s.n., from Sierra Leone.

ERIOCAULON THWAITESII Körn.

Additional bibliography: Thwaites, Enum. Pl. Zeyl. 2: 341. 1839; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 304. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 206. 1968; R. R. Rao, Stud. Flow. Pl. Mysore Dist. 2: 876 [thesis]. 1973; Moldenke, Phytologia 26: 33 & 40--41 (1973) and 29: 86. 1974.

Recent collectors have found this species growing in rice paddy fields, in muddy roadside streams, and in wet rock areas, at 2613 feet altitude, flowering and fruiting from January to March. Material of this species has been misidentified and distributed in some herbaria as E. truncatum Hamilt. The Thwaites C.P.790, cited below, is a mixture with E. neesianum Körn. (of which it is the type collection) and E. truncatum Hamilt.; Fyson s.n. [Kitulgale, 4/3/82], distributed as E. thwaitesii, is E. truncatum.

Additional citations: SRI LANKA: Amaratunga 449 (Pd); G. Gardner O.C.936 [Thwaites C.P.790, in part] (Pd, Pd); Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28310 (Ac, Gz, Ld, Pd, Z), 28340 (Ac, E, Gz, Kh, Ld, Tu), 28341 (Ld); Sumithraarachchi DBS. 116 (Z); Sumithraarachchi & Fernando DBS.128 (Ld).

ERIOCAULON TOFIELDIIFOLIUM Schinz

Emended synonymy: Eriocaulon tofieldiifolium Schinz apud Friedrich-Holzhammer & Roessler in Merxmüller, Prodr. Fl. Südw. Afr. 15, 159: [i] & 2. 1967.

Additional & emended bibliography: Friedrich-Holzhammer & Roessler in Merxmüller, Prodr. Fl. Südw. Afr. 15, 159: [i] & 2. 1967; Moldenke, Phytologia 25: 83. 1972.

Friedrich-Holzhammer & Roessler (1967) cite for this species only the type, Dinter 378, from "sumpfige Stellen am Waterberg", Dinter 1757, and Volk 2744 from Namibia.

ERIOCAULON TOGOENSE Moldenke

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 232 & 237--238. 1901; Moldenke, Phytologia 26: 465. 1973.

Brown (1901) cites only the type collection, Barter 778, from "in the drier part of a swampy pond near Fakum", Borgu, Niger Territory [Northern Nigeria].

ERIOCAULON TRANSVAALICUM N. E. Br.

Additional bibliography: Moldenke, Phytologia 26: 265. 1973.

Lewalle collected this plant at 1900 meters altitude in Burundi.

Additional citations: BURUNDI: Lewalle 2707 (Gz).

ERIOCAULON TRANSVAALICUM var. HANNINGTONII (N. E. Br.) Meikle

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 236, 253, & 255. 1901; Moldenke, Known Geogr.

Distrib. Verbenac., [ed. 2], 117 & 204. 1949; Moldenke, Phytologia 26: 465. 1973.

Brown (1901) cites only the type collection, Hannington s.n., from Kwa Chiropa, Tanganyika, and comments that "This is very similar to E. zambesienae, Ruhland, in appearance, but, in the single sample seen, the peduncles are much shorter and the flowers are quite different in structure. From E. elegantulum, Engl. (which it also closely resembles), the pallid involucral-bracts will at once discriminate it."

ERIOCAULON TRILOBATUM Ruhl.

Additional bibliography: Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Moldenke, Phytologia 25: 84. 1972.

ERIOCAULON TRUNCATUM Hamilt.

Additional & emended bibliography: H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 357. 1899; Backer, Handb. Fl. Java 3: 7. 1924; Backer, Onkruidfl. 1 [Handb. Suiker.-Cult. 7]: 177--178 & 844, pl. 187. 1928; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Alston in Trimen, Handb. Fl. Ceylon 6: 304 & 306. 1931; Alston, Kandy Fl. 76. 1938; Bond, Wild Fls. Ceylon Hills xiii, 232, & 233. 1953; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Burkill, Dict. Econ. Prod. Malay Penins. 1: 953. 1966; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Keng, Ord. & Fam. Malay. Seed Pl. 313 & 314, fig. 183. 1969; Sharma, Nucleus 15: Append. 10. 1972; Moldenke, Phytologia 26: 466 (1973), 28: 446 (1974), and 29: 86, 96, & 100. 1974.

Additional illustrations: Backer, Onkruidfl. 1 [Handb. Suiker.-Cult. 7]: pl. 187. 1928; Bond, Wild Fls. Ceylon Hills 233. 1953; Keng, Ord. & Fam. Malay. Seed Pl. 313, fig. 183. 1969.

Alston (1931, 1938) suggests that this species and E. minimum Lam. may be conspecific and, if so, the latter would be the valid name for the taxon. Pearson (1899) found E. truncatum "very abundant above 5000 feet" altitude in Sri Lanka and cites his nos. 61 (from 5600 feet) and 65 (from 5800 feet). Thwaites (1839) cites his C.P."790 (793)" as very common in company of E. thwaitesii Körn. C.P.790, as seen by me in the Peradeniya herbarium, is a mixture with E. thwaitesii, at least insofar as the Gardner O.C. 936 portion is concerned.

Recent collectors have found E. truncatum growing in rice-fields, in streams, in loose moist sandy soil, in marshy grasslands, "in a pool and along its edge", and in clay soil of sunny roadside ditches more or less in water, flowering and fruiting in practically every month of the year, from sealevel to 1000 feet altitude, and describe the flowering heads in general as grayish-white. Additional vernacular names recorded for it are "babawangan" (in Java) and "short-leaved pipewort" (in Malaya). Sharma (1972) records the chromosome counts of 30 and 32.

The G. Thomson s.n. [Maisor, Carnatic], cited below, is a mix-

ture with E. diana Fyson, while Amaratunga 1149 is a mixture with E. cinereum R. Br.

Hu describes E. truncatum as the "smallest species in the [Hongkong] area....few leaves....heads 2--3 mm. in diameter.....bracts not papillose, rounded at the apex....flowers white" and notes that it is "smaller than 5956 and 5957".

Material has been misidentified and distributed in some herbaria as E. cinereum R. Br., E. setaceum L., E. thwaitesii Körn., and E. trimenii Hook. f. On the other hand, the Collector undetermined s.n. [Dambulla Rock, 20 Dec. 1881], distributed as E. truncatum, is E. minimum Lam. and Moldenke, Moldenke, Dassanayake, & Jayasuriya 28340 & 28341 and Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28310 are E. thwaitesii Körn.

Additional citations: INDIA: Mysore: G. Thomson s.n. [Maisor, Carnatic] (Pd). West Bengal: Helfer 136 (Gz). SRI LANKA: Alston 1210 (Pd), 1215 (Pd), 1216 (Pd), s.n. [Peradeniya Estate, 17.9.26] (Pd); Amaratunga 1149, in part (Pd), 1759 (Pd); Collector undetermined s.n. [Meddekande, Balamgoda, Sept. 1895] (Pd); Cramer 2914 (Pd); Fyson s.n. [Kitugale, 4/3/82] (Pd); G. Gardner s.n. [Thwaites C.P.790, in part; Rambodde, Jan. 1847] (Pd); J. M. Silva s.n. [Kalugannamam, 1.2.1927] (Pd); N. D. Simpson 9613 (Pd); Thwaites C.P.790, in part [Ambagama, Dec. 1854] (Pd); L. C. Wheeler 12056 (Pd). BANGLADESH: Hooker & Thomson s.n. [Chittagong, 1--1000 ped.] (Pd). HONGKONG: S. Y. Hu 5591 (W--2711359), 5958 (W--2697303), 8111 (W--2711196), 8554 (W--2711166). MALAYA: Perak: Wray 782 (Pd).

ERIOCAULON ULAEI var. RADIOSUM Ruhl.

Additional bibliography: Moldenke, Phytologia 25: 86 (1972) and 28: 438. 1974.

Reitz & Klein found this plant growing at 1000 meters altitude, flowering and fruiting in October.

Additional citations: BRAZIL: Santa Catarina: Reitz & Klein 10251 (Z).

ERIOCAULON VANHEURCKII Muell.-Arg.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Venkatareddi, Bull. Bot. Surv. India 12: 220. 1970; Moldenke, Phytologia 25: 75 & 86--87 (1972) and 28: 444. 1974.

Venkatareddi (1970) found this plant "Common on plateau", flowering in August and September, and cites his nos. 98776 & 99007.

Additional citations: INDIA: Kerala: Santapau 13285 (E--1624142), 13322 (E--1624125), 13323 (E--1624124), 13360 (E--1624112).

ERIOCAULON VOLKENSII Engl.

Additional & emended bibliography: Engl., Pflanzenw. Ost-Afr. C: 133--134. 1895; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233 & 238. 1901; Moldenke, Phytologia 25: 128. 1973.

Brown (1901) cites Volkens 2032 & s.n. from Tanganyika, found there in damp depressions on Mt. Kilimanjaro, at 1100 feet altitude.

ERIOCAULON WALKERI Hook. f.

Additional bibliography: Alston in Trimen, Handb. Fl. Ceylon 6: 304 & 306. 1931; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 26: 41--42 (1973) and 29: 86. 1974.

Alston (1931) notes that "This is considered to be a variety of E. quinquangulare by Fyson.....but he should have adopted Thwaites' name for it." He also claims that this species is mentioned by Fyson, Journ. Indian Bot., on a page "31", but I can find no such reference on that page in either volume 2 or 3 of that journal in which Fyson wrote on the Eriocaulaceae of India.

Recent collectors describe E. walkeri as a small plant, 5--8 cm. tall, the scaped 7-ribbed, the heads flat-topped, white, and the bractlets pale-brown in color. They have found it growing on sandy lagoon margins and "locally abundant" in moist sand with short-sedge vegetation, at 1700 feet altitude, flowering in January, April, and June. Material has been misidentified and distributed in some herbaria as E. quinquangulare L.

Additional citations: SRI LANKA: Collector undetermined s.n. [near Vakameri, 21.IV.07] (Pd); Mueller-Dombois & Cooray 68012817 (Pd); School teacher s.n. [6-4-1905] (Pd); N. D. Simpson 9875 (Pd); Thwaites 3562 (Pd).

ERIOCAULON WELWITSCHII Rendle

Additional synonymy: Eriocaulon welwitschii (Rendle) Ruhl., in herb.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 234 & 249. 1901; Friedrich-Holzhammer & Roessler in Merzmueller, Prodr. Fl. Südw. Afr. 15, 159: 2. 1967; Moldenke, Phytologia 25: 87. 1972.

Brown (1901) cites only Welwitsch 2441, the type collection, from "between Lombe and Candumba, between 2400 and 3800 ft.", Pungo Andongo, Angola, and notes that the collector says "only seen in one place". The E. welwitschii var. pygmaeum Rendle is now considered to be a synonym of E. aristatum H. Hess, which see. Robinson collected E. welwitschii at 1250 meters altitude, flowering in June.

Additional citations: ZAMBIA: E. A. Robinson 3735 (Mu).

ERIOCAULON WIGHTIANUM Mart.

Additional synonymy: Eriocaulon wightianum var. capitulis nigro-cinereis, parce pilosis Thwaites, Enum. Pl. Zeyl. 2: 341. 1839.

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 29. 1833; H. H. W. Pearson, Journ. Linn. Soc. Lond. Bot. 34: 320 & 357. 1899; Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Alston in Trimen, Handb. Fl. Ceylon 6: 305. 1931; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 140. 1959; Moldenke, Phytologia 25: 42 (1973) and 29: 96. 1974.

Thwaites' variety, cited in the synonymy above, is based on Thwaites C.P.3382. Pearson (1899) describes E. wightianum as a "large species, common above 5000 feet" altitude in Sri Lanka, citing his no. 72 from 5600 feet. He also notes that "Eriocaulon wightianum together with Anaphalis oblonga, Exacum zeylanicum, Polygala glaucoides, Blumea flexuosa, etc. parts found in 1'0 feet of wet black humus exposed in road cutting in Ambavela [Sri Lanka] - 5900 ft."

The Thwaites C.P.378 [G. Gardner O.C.938], distributed as E. wightianum, is actually E. nilagirensis Steud., Siranji s.n. [31.3. 69] is E. odoratum Dalz., and Amaratunga 1240 is E. sexangulare L.

Additional citations: INDIA: Kerala: Stocks, Law, &c. s.n. [Malabar, Concan] (Pd). West Bengal: Helper 135 (Gz).

ERIOCAULON WIGHTIANUM var. HELFERI Hook. f.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 [135]. 1929; Fedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Moldenke, Phytologia 25: 38. 1972.

ERIOCAULON WILLDENOVIANUM Moldenke

Additional bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 503. 1894; Backer, Handb. Fl. Java 3: 6. 1924; Alston in Trimen, Handb. Fl. Ceylon 6: 304 & 306. 1931; Perrier de la Bâthie, Cat. Pl. Madag. 21. 1934; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 141. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 207. 1968; Moldenke, Phytologia 26: 466 (1973), 28: 401, 445, & 457 (1974), and 29: 86. 1974.

Alston (1931) asserts that this species differs from E. sexangulare L. in having its florets dimerous (instead of trimerous) and the bractlets acute (not acuminate). He further comments that "This species is given for Ceylon in the Fl. Brit. Ind. & by Ruhland; it is scarcely separable from E. sexangulare Linn." My wife and I found it quite abundant in certain of the very low-lying and extremely wet parts of coastal Sri Lanka.

Additional citations: SRI LANKA: Moldenke, Moldenke, Sunithraarachchi, & Waas 28313 (Ac, E, Gz, Kh, Id, Pd, Tu).

ERIOCAULON WILLDENOVIANUM var. FERGUSONII Moldenke, Phytologia 28: 401. 1971.

Synonymy: Eriocaulon wallichianum var. fol. hirsutis Ferguson ex Moldenke, Phytologia 28: 457, in syn. 1974.

Bibliography: Moldenke, Phytologia 28: 401, 445, & 457. 1974.

Ferguson's variety is described by him as having the leaves and sheaths "long-pilose", and this description fits quite well the specimen on whose label it is written in the Peradeniya herbarium. The same description is written on the sheet of Alston 1062 in the same herbarium, plus the phrase "anthers gray".

Additional citations: SRI LANKA: Alston 1062 (Pd); W. Ferguson s.n. [Cinnamon Gardens, Colombo, March 1983] (Pd--type).

ERIOCAULON WOODII N. E. Br.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 242. 1901; Moldenke, Phytologia 26: 466. 1973.

ERIOCAULON XERANTHEMUM Mart.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 51 (1): 169 & 170 [135 & 136]. 1929; Pedde in Just, Bot. Jahresber. 51 (2): 296. 1933; Venkatareddi, Bull. Bot. Surv. India 12: 220. 1970; Moldenke, Phytologia 25: 89 (1972), 25: 152 & 239 (1973), and 28: 446. 1974.

Venkatareddi (1970) found this plant "occasional", flowering in August and September, and cites his no. 99103.

Additional citations: INDIA: Assam: Hooker & Thomson s.n. [Mont. Khasia, 4000 ped.] (Pd). Kerala: Stocks, Law, & Co. s.n. [Malabar, Concan] (Pd). THAILAND: Larsen, Larsen, Nielsen, & Santisuk 32183 (Ac).

ERIOCAULON ZAMBESIENSE Ruhl.

Additional bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 233, 235, 252--253, & 255. 1901; Perrier de la Bâthie, Cat. Pl. Madag. 22. 1934; Moldenke, Phytologia 26: 466. 1973.

Perrier de la Bâthie (1934) records this species from central Madagascar, but I have seen no material of it from Madagascar. Brown (1901) cites Buchanan s.n., Whyte s.n. [Mount Malosa], and Whyte s.n. [Mount Zomba] from Nyasaland and says that the last-named collection was erroneously attributed to Johnston by Ruhland. He further notes that "Ruhland has described the female bracts as villous and the male bracts as subglabrous at the apex, and the petals of the male flowers as glandless. I find them to be the reverse of this. The heads are viviparous on the Mount Zomba specimens."

ERIOCAULON ZOLLINGERIANUM Körn.

Additional bibliography: Backer, Handb. Fl. Java 3: 8. 1924; Moldenke, Phytologia 26: 42. 1973.

ERIOCAULON ZYOTANII Satake

Additional bibliography: Moldenke, Phytologia 25: 90. 1972; Hocking, Excerpt. Bot. A. 23: 292. 1974.

[to be continued]

APPRAISAL OF HAWAIIAN TAXONOMY

Otto & Isa Degener

"List of Flowering Plants in Hawaii," authored by Harold St. John August 30, 1973, is Memoir Number 1 of the Pacific Tropical Garden of the Island of Kauai. The book, in board covers, comprises 519 pages. It is a vade mecum for the professional botanist and advanced student interested in the taxonomy of the Hawaiian Islands. It is indispensable for every institution housing a collection of Polynesian plants. The body of the book devotes pages 9 to 13 to Gymnospermae; 14 to 132 to Monocotyledones; 133 to 369 to Dicotyledones; 369 to 374 to "New Names or Combinations"; 375 to 378 to an addendum; and finally an index ending with page 519.

"The aim of this publication is to present a list of the flowering, or higher, plants known to be in the Hawaiian flora. For each is given the scientific and common names of the plant, genus, species, and infraspecific taxon. The name of the author of the scientific name is given in full or in abbreviation, and the date of publication is added. If the plant is restricted to one or more of the Hawaiian Islands, hence a native to that region, its scientific name is printed in bold face, - - - and the islands where it occurs are listed. If it is native to the islands, but also to other regions, it is printed in bold face and is marked indig. - - -. If it is an introduced weed, it is printed in Roman type - - -. If the plant is described or mentioned in any of the four basic books on Hawaiian botany, those by Hillebrand, Rock, Degener, and Neal, a page reference to it is given. Since the date of publication of each scientific name is given, it would have been helpful also to have given the full reference to its place of publication. Although these references were verified, this detail is deemed beyond the scope of the present summary."

To be sure, full citation of species would have added to the cost and bulk of the volume quite unnecessary as such information, except for dates, is readily available in the Index Kewensis. For us the reviewers, however, full citation of trinomials ignored by the Index would have enhanced still more the value of the "List" by saving the reader the drudgery of scouring a library for such obscure references.

Because the taxonomic characters of a population of plants are so variable and various taxonomists judge the importance of characters differently, no two workers can be expected to agree fully on the precise composition of a flora. To the lay person this sincere search for truth by each variable taxonomist and his temerity to express it in print may appear as mere quibbling. The present "List" is the mature botanical judgment of the author. It is not necessarily that held by us, the reviewers, no mean emulators. With this in mind, we here do not express any botanical differences, but rather our opinions regarding orthography.

In almost 8,000 scientific plant names the reader can expect

typographical and other errors made by the author and/or type setter, and never noted by the proofreader. Among such annoyances, we wish the author had used in keeping with Article 73, note 6 rather than note 5 of the International Code, the specific names kauaiensis and mauiensis rather than kavaiensis (p. 188 & elsewhere) and maviensis (p. 207 & elsewhere). According to a local gazetteer, the islands Kauai and Maui were never called "Kavai" and "Mavi." On the other hand, he erroneously ascribes the binomial Xanthium pennsylvanicum to O. Degener (p. 369) without comment when the latter expressly stated why he used "pennsylvanicum." Incidentally, the correct archaic spelling "pennsylvanicum" is used in Recommendation 73D of the Code.

Regarding an epithet taken from the name of a man, the author cites over eighty binomials, such as Calamagrostis Hillebrandii (p. 22) in which the specific word fails to end in "ii." He similarly cites about ten binomials such as Carex Nealae (p. 44), honoring Marie C. Neal, without using our preferred orthography "nealiae." At times incorrect specific names, such as "Eragrostis Hosakae" (p. 28) are corrected emphatically to "Hosakae"; yet a bit inconsistently such errors as "Pritchardia Munroii" (p. 58), "Cyrtandra Wawrai" (p. 314) and "Plantago Krajinai" (p. 319) fail of correction and comment. In about fifty cases where species names are of compound origin, the connecting vowel or vowels are wrong. Thus "Drymophloeus olivaeformis" is corrected to D. oliviformis (p. 54), yet the name "Alyxia olivaeformis" (p. 279), that of a common Hawaiian liana, remains a stumbling block for the gullible student reader. There, no correction is made. Too many connecting vowels are "iae" instead of the correct "ii." The present comment is registered with the hope that the author will make desirable changes in a future edition, and that botanists of the world will vote to alter Recommendation 73C (and many others) in the Code into retroactive mandates. It would ease such burdens to memory whether the species name of a certain Hawaiian plant is correctly spelt the archaic way "hillebrandii" and "nealae" or spelled in the more modern way "hillebrandii" and "nealiae."

The spelling of the generic names Exocarpos (see p. 148) and Sigesbeckia (see p. 366) have been conserved over all other names in spite of prior date of publication. "Eichornia" (p. 79) is an error. "Eichhcrnia," though strange to a reader not versed in German, is correct. A squirrel in Germany is called Eichhörnchen because, we presume, it favors living in Eichen or oak trees, and has ears each with a horn-shaped tuft of fur. The botanist Eichhorn, for whom the waterhyacinth genus was named by Kunth in 1842, we imagine, had some forebear somehow associated with the squirrel. Be that as it may, the double "hh" in Eichhornia is the proper orthography.

One of the reviewers who introduced the lovely, silky garden and street tree, the var. sericea, to Hawaii from New Providence Island (Nassau) in 1946, used the binomial Conocarpus erecta L., for the glabrous plant in the Flora Hawaiiensis in 1937. To alter "erecta" to erectus" is not a correction, but quite the opposite. Linnaeus, like many of his contemporaries, was a classical Latin scholar who considered a tree

feminine, like arbor, the Latin word for tree. Should we alter the bi- and trinomials of these trees, to be consistent we should alter the binomials Quercus alba (white oak), Q. macrocarpa (largefruited oak) and Q. rubra (red oak). To consider a "modern" genus ending in "carpus" masculine is Recommendation 75A of the Code. It is not retroactive, however, as the author St. John explains on page 206.

Botanists are human, and the author is no exception. He favors most of the opinions held by a former protégé regarding local Rubiaceae even though three or four colleagues disagree. Chromosome counts, not available years ago, appear to discredit some older beliefs regarding relationships.

The "List" is so valuable for its many facts regarding our state of knowledge up to 1973 of the local flora that any of the above adverse remarks are trivial. The volume initially sold for \$22.50; but due to a disastrous flood April 1974 all unsold copies were damaged and now sell from \$5 to \$15 depending on their condition. This may be the logical time for the publication of a new edition that will follow the latest precepts demanded by the International Code of Botanical Nomenclature.

The book's "Summary of the Flowering and Seed Plants in the Hawaiian Flora," page 4, prompts the following digression:

We the reviewers believe the Hawaiian Archipelago may well have boasted an endemic flora of 50,000 endemic species and infraspecific taxa before the advent of man. At that time close to 99% of the native organisms occurring in the Islands from sea coast to mountain top were endemic. The Hawaiian Islands before man's coming were truly a Paradise of the Pacific.

Man first discovered the Hawaiian Islands just a few thousand years ago. This man belongs to the Polynesian race, and brought with him during frequent voyages animals and plants. Among the former were dogs, pigs, chickens and, probably as stowaways, rats. Among the latter introductions were many plants useful as clothing, food, and medicine - mostly cultigens of Marquesan, Samoan and Tahitian origins.

As the Polynesians bred and multiplied on the choicest islands to develop into a superb new strain aptly called Hawaiian, the lowlands particularly in the drier, lee sides and the coastal valleys on the wetter, windward side became heavily populated. "Overpopulation" was tempered not by infectious diseases but rather by famine, war, infanticide, and sacrifice of men on the altar. Set fires and the pursuit of agriculture wiped out much of the original, extensive, dry forests; and *Pritchardia palm groves and shrubby plains where so many endemic taxa are usually restricted to very limited areas. Man and especially feral pigs, certainly decimated the vegetation in many areas where agriculture was not practiced. We shall not mention the slaughter for food and feathers of flightless and other birds, and the hunting of the monk seal. Thus a few thousand years of pseudoneolithic man exerted a profound influence on the biota.

The second discovery of the Hawaiian Islands occurred during the Sixteenth Century when a Spanish galleon was shipwrecked on the Is-

*Phytologia 21:320-326. 1971.

land of Hawaii - galleons have been sailing yearly between Acapulco, Mexico and Manila, Philippines for centuries. In fact, the map of the Pacific Ocean published by Vincenzo Maria Coronelli in 1696 shows a group of islands that might easily represent the Hawaiian Archipelago. Early Spanish maps likewise indicate the awareness of similar islands. The "unwritten literature" or epics of the Hawaiians handed down from father to son and from priest to priest refer to the coming of Spaniards. In fact some Hawaiians, among them a teacher, living along the Kona Coast of Hawaii maintain their relationship to some of these Spaniards. Also, natives were in possession of metal of European origin before Captain Cook's coming, and they may have had the pineapple or hala-kahiki since Spanish times. In the Museum für Völkerkunde in Berlin we inspected in 1952 a heroic statue fashioned of typical Hawaiian lava with gas cavities and olivines. It had been dug up in the early Nineteenth Century in a taro patch, so we were told, To us the figure represents a Spanish grandee, perhaps idolized by the Hawaiians. We doubt the Spaniards, however exerted any baneful influence on the endemic biota.

The third discovery of the Hawaiian Islands began with Captain Cook's landfall in 1778. This opened the Islands up to the present to two hundred years of viciously efficient extermination of endemics by the introduction of Occidental and Oriental crop plants, ornamentals, trees for timber, and aggressive Mainland weeds and plant diseases; to livestock and herbivorous game animals preferring an endemic diet; to aggressive insect pests; and to the bulldozing of vast areas for human habitation, roads, golf courses, etc. Some of such destruction of endemics is unfortunate but justifiable; yet much is inexcusable, wanton vandalism. Due to population pressure, this destruction during the last few "bulldozer decades" has been geometric rather than arithmetic in progression.

Yet despite wholesale destruction, goodly proportions of most islands are still relatively undefiled, particularly in our two National Parks, in the fogbelt too wet for crop plants and farm animals, and on the precipitous slopes. Botanists of the world should realize that the Hawaiian Islands are still the Mecca for taxonomic research - such work has hardly begun! Too often when a novelty has been discovered that does not fit any description in Hillebrand's "Flora of the Hawaiian Islands," an excellent book for the time it was published posthumously in 1888, the finder would discard it with the casual remark that endemics are hopelessly polymorphic or that his specimen represents an individual belonging to a swarm of hybrids. To us the author's statement that endemic species and infraspecific taxa number 2,668 is patently absurd; nor are we at all in agreement that "The endemic, indigenous, and adventive plants in the flora have been well collected and are now quite well known."

It has long been our conviction that the flora of the Hawaiian Islands in Captain Cook's time did not consist of a mere 2,668 taxa, but of 20,000 or more likely 30,000! Diligent monographic work on historical specimens collected since David Nelson's botanizing during Cook's voyage and diligent collecting and studying of

the presently surviving flora, should enable us to know perhaps about half the elements that were living two hundred years ago. An inkling of our assertion of the number of taxa is shown, for example, by the author's treatment of the genus Cyrtandra (Gesneriaceae), beginning on page 308. Note our tabulation, based on the "List," for the major islands of the Hawaiian Archipelago:

ISLAND	NUMBER OF TAXA	SQUARE MILES	SUMMIT IN FEET
Oahu	128	604	4,045
Maui	29	728	10,025
Hawaii	23	4,030	13,792
Kauai	22	555	5,170
Molokai	13	260	4,970
Lanai	4	141	3,370

Cyrtandra taxa are partial to wet jungles, and these peter out above the inversion layer where the terrain becomes increasingly dry. This is at about 7,000 feet elevation. Hawaii and Maui, with high mountains, nevertheless have vast rainforests. Can it be true that they harbor but 23 and 29 Cyrtandrae respectively? Though Kauai has about fifty square miles less area than Oahu, it has a somewhat greater elevation. This greater range in resulting temperature might well increase speciation. Kauai, according to the author, has 22 taxa to Oahu's 128! In fact, while Oahu with its 604 square miles has 128; the other five islands with a combined total of 5,814 square miles have only 91. The explanation for such discrepancies is not botanical, but HUMAN.

Oahu has been the center of human activity for nigh unto two hundred years. It is the seat of the capital, Honolulu, where the Bishop Museum and the University are located. Most visiting botanists resided there, and collected within easy walking, riding or driving distance of the city. Teachers, not excluding the author of the "List," scoured Oahu with their students week-ends and holidays for its botanical riches. The "outside islands," in contrast, always have been neglected. What wealth of plants must still be growing there unknown to man! What applies to Cyrtandra, relatively unknown in the Archipelago excepting on Oahu, applies more or less to the remaining native genera.

With this in mind, we appeal to the biological workers of the world to come to this Mecca to collect its neglected riches before "progress" destroys them. With the torch of knowledge flickering feebly during the last decade of questionable political ethics in Washington, Federal funds for Hawaiian taxonomy have nigh dried up. Even the fabulous Marie C. Neal Herbarium is lying fallow in Honolulu for want of funds. As botanists cannot prevent the continuous slaughter of one endemic taxon after another, they should at least attempt to collect, preserve and record as much of the Hawaiian flora that is still extant so that future generations shall better understand what a splendid Paradise of the Pacific their forebears lost.



(Courtesy, Museum für Völkerkunde, Berlin)

Presumably a Spanish grandee sculptured in Hawaiian lava



(Courtesy, Museum für Völkerkunde, Berlin)

Presumably a Spanish grandee sculptured in Hawaiian lava

STUDIES IN THE HELIANTHEAE (ASTERACEAE). III.

A NEW SPECIES OF SCHISTOCARPHA.

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Material of the genus Schistocarpha is frequently encountered among specimens casually determined as Eupatorium. This is particularly true of S. oppositifolia (Munz) Rydb. with its reduced female flowers in many series. Unfortunately, the uncritical use of broad genus concepts such as Eupatorium and Senecio has encouraged such misidentifications. The species of Schistocarpha described here had been annotated as Eupatorium in spite of rather distinct rays.

Members of the genus Schistocarpha are notable for the capillary pappus and multiseriolate unequal involucrel bracts, both of which provide a resemblance to members of the Eupatorieae. The genus has been placed until recently in the Senecioneae mostly because of the combination of capillary pappus and ray flowers. The structure of the anthers with their keeled appendages, the form of the hairs on the corolla and the form of the paleae on the receptacle has more recently shown the genus to be clearly a member of the Heliantheae (Robinson & Brettell, 1973).

The new species of Schistocarpha is distinguished partly by the prominent rays, the unwinged petioles and the sparsely pilose stems. The involucrel bracts are glabrous on the outer surface and have mostly short-pointed tips. Closest relationship seems to be with S. seleri Rydb. and S. longiligula Rydb. and the involucrel bracts of the latter have rather densely fringed tips similar to those of the new species. Both S. longiligula and S. seleri have pedicels and branches of the inflorescence densely hirtellous while the new species has only very sparse long-stipitate gland-tipped hairs. The new species also has the most easily deciduous pappus seen in the genus, and the achenes are often completely epappose after extraction from the head.

The rather recently described Schistocarpha hondurensis Standley & L.C. Williams is close to S. seleri as indicated in the original description. The rays of S. hondurensis seem slightly shorter and broader than typical S. seleri, but the differences originally cited for the petioles have no value, and the rays alone do not seem to warrant species distinction. The species is represented by many collections from southern Mexico,

Guatemala, El Salvador, Honduras and Nicaragua.

The new species is named after Dr. Julian Steyermark now at the Instituto Botánico in Caracas, Venezuela. Dr. Steyermark's work in association with Dr. Paul Standley is the basis for the Flora of Guatemala series.

Schistocarpha steyermarkiana H. Robinson, sp. nov.

Plantae suffrutescentes erectae 1-2 m altae ? pauce ramosae. Caulis subrubrescentes teretes vel substriati parce pilosi vel subglabri. Folia opposita, petiolis 1.5-4.0 cm longis non alatis; laminae late ovatae 5-12 cm longae 2-9 cm latae base abrupte breviter acuminatae ascendenter trinervatae margine multo argute serratae apice distincte anguste acuminatae supra parce pilosae subtus subpallentescentes in nervis sparse pilosae. Inflorescentiae laxae paniculatae, pedicellis 4-13 mm longis glandulis minutis longiuscule stipitatis sparse obsitis. Capitula ca. 1 cm alta ca. 7-8 mm lata. Squamae involucri ca. 25 valde inaequilongae ca. 4-seriatae 3-7 mm longae plerumque 1.5 mm latae oblongo-lanceolatae apice obtusae vel subacutae extus glabrae straminae vix vel non striati superne subrubrescentes margine superne dense comatae. Paleae anguste lineares apice anguste acutae breviter fimbriatae non laceratae. Corollae flavae; corollae radii ca. 8-10, tubis ca. 1.5 mm longis indistinctis glabris, limbis ca. 7-9 mm longis anguste ellipticae; corollae disci ca. 25-30, ca. 5.5 mm longae, tubis distinctis ca. 2 mm longis dense hispidulis, limbus tubularibus glabris, lobis ca. 0.8 mm longis ca. duplo longioribus quam latioribus glabris; thecae antherarum ca. 1.5 mm longae, appendicibus ca. 0.5 mm longis angustis ovatis; achaenia ca. 3 mm longa glabra vix costata; carpopodia valde asymmetrica; setae pappi ca. 15-20 perfacile deciduae ca. 3-4 mm longae. Grana pollinis ca. 25 μ diam.

Type: GUATEMALA: Sacatepéquez: Volcano Agua, alt. 10,000 ft. 4 Feb. 1908. W.A.Kellerman 7223 (Holotype US).

The species is known only from the type collection. The ray corollas of the species seem distinctive in the rather indistinct glabrous bases. The disk corollas also differ from those of related species by their glabrous lobes.

Literature Cited

Robinson, H. and R. D. Brettell 1973. Tribal revisions in the Asteraceae. IV. The relationships of Neurolaena, Schistocarpha and Alepidocline. Phytologia 25: 439-445.



Schistocarpha steyermarkiana H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Schistocarpus steyermarkiana H. Robinson, Holotype, enlargement of heads.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXII.

THE GENUS, PHALACRAEA.

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The name Phalacraea has long resided in the synonymy of the genus Piqueria as the latter has been interpreted broadly to include all members of the Eupatorieae without pappus or anther appendage. The present concepts of Piqueria limit the genus to a very distinctive group of species, primarily of Mexico, that have 3-5 phyllaries in a head with an equal number of flowers, papillose anther filaments, and achenes with sparse punctations. The andean genus, Phalacraea proves distinct in all these characters and different from other close relatives in the generally flat receptacle, the lack of non-glandular hairs on the base of the corolla, the numerous setae on the achene, and the rather straight sometimes attenuate base of the achene. The genus also differs from other relatives of Piqueria by the short-acute phyllaries.

Within the genus Phalacraea there is some variation in the shape of the achene base. Three of the species have attenuate bases while P. callitricha has a short broad base. This difference does not detract, however, from the uniformity of the carpopodium which is reduced to a narrow basal rim consisting of a few series of small cells. The non-carpopodial nature of the slender bases of three of the species is emphasized by the numerous setae on their surface. Such carpopodia are very distinct from other segregates of Piqueria and might seem to preclude any close relationship but for the example of somewhat similar structure in Piqueria serrata A. Gray.

Phalacraea A. P. Decandolle, Prodr. 5:105. 1836.

Plants herbaceous, erect from decumbent bases, with few to many branches. Leaves opposite, petioles distinct, slender; blades broadly ovate to triangular, crenate to serrate. Inflorescence laxly alternately branching, broadly cymose. Involucral bracts 10-18 in 2-3 series, subequal, broad with short-acute non-scarious tips, with few to many hairs and glandular punctations on outer surface; receptacle flat to slightly convex. Flowers 10-18 per head; corollas with distinct basal tube and usually expanded abruptly into

a broadly cylindrical limb, tube with many scattered minutely gland-tipped hairs, less hairs on limb, surface of limb with few to many mamilllose cells, lobes slightly longer than wide with inner surface covered by prominent rounded papillae, outer surface smooth with glandular punctations and no hairs; cells rather lax with sinuous walls; filaments with lower part non-papillose, anther collar rather stout, cells mostly subquadrate to shortly oblong with very close prominent annular thickenings, anther tip bilobed usually with two separated minute vestiges of appendage; style with base glabrous, unenlarged; style branches broad, becoming slightly broader up to broadly rounded tips, surface densely covered with high papillae; achene elongate with 4-5 ribs, with numerous setae on sides and base, wall internally with crowded minute punctations, basal trace nearly straight; carpopodium a narrow rim with 2-3 rows of small subquadrate cells; pappus completely lacking.

Type species: Phalacraea latifolia A.P. Decandolle

Key to species of Phalacraea

1. Leaves broadly deltoid with mostly subcordate to truncate bases; heads larger, 5-6 mm high; corollas 4-5 mm long, inner surface of corolla limb with very few papillae. . . . P. latifolia
1. Leaves ovate with slightly cuneate bases; heads 4-5 mm high; corollas 2-3 mm long, inner surface of corolla limb densely papillose 2.
2. Corolla limbs less abruptly expanded at base to ca. 3 times as wide as tube; base of carpopodium scarcely narrowed. . . . P. callitricha
2. Corolla limbs very abruptly expanded and even retrorsely bulging at base, becoming 4-5 times as wide as tube; achene with distinct narrow twisted base 3.
3. Leaves very bluntly acute; 14-18 broadly elliptical involucre bracts with broadly acute to obtuse tips. P. pittieri
3. Leaves mostly short acuminate; usually 10 oblong involucre bracts, tips of bracts rather sharply acute . . . P. ecuadorensis

The combinations of the four species are as follows.

Phalacraea callitricha (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Piqueria callitricha B.L.Robinson, Proc. Amer. Acad. 42:15. 1906. Colombia.

Phalacraea ecuadorensis R.M.King & H.Robinson, sp. nov.

Plantae procumbentes sensim erectae herbaceae usque ad 80 cm altae pauce ramosae. Caules fulvescentes teretes striati puberuli. Folia opposita, petiolis usque ad 2.5 cm longis; laminae ovatae usque ad 5 cm longae et 3.5 cm latae base late cuneatae trinervatae margine multo serrato-dentatae apice breviter acuminatae supra sparse pilosae et minute puberulae subtus minute puberulae et glandulo-punctatae in nervis sparse pilosae. Inflorescentiae cymosae vel subcymosae, pedicellis 1-15 mm longis glandulis longiuscule stipitatis dense obsitis. Capitula 4-5 mm alta; flores ca. 15-18; squamae involucri 10-12 plerumque 10 eximbricatae ca. 2-seriatae subaequilongae oblongae ca. 2.5 mm longae 0.6-0.8 mm latae bicostatae apice acutae extus glanduliferae superne densius minute piliferae; corollae 2.5-3.0 mm longae, tubis valde distinctis ca. 0.7 mm longis glandulis stipitatis obsitis, limbis ca. 1.5 mm longis abrupte late campanulatis intus papillosis lobis 0.5-0.8 mm longis plerumque aequilateraliter triangularibus vel parum longioribus intus dense papillosis extus sparse glandulo-punctatis; filamenta antherarum in parte superiore ca. 200 μ longa; thecae ca. 600 μ longae; achenia ca. 2.0 mm longa setifera base breviter distincte stipitata; carpopodia superne setifera, cellulis basilariibus quadratis vel breviter oblongis ca. 10 μ latis. Grana pollinis ca. 25 μ diam.

Type: ECUADOR: Azuay: along the road to Naranjal, ca. 14 kms generally W of Cuenca. Elevation ca. 10,000 ft. February 2, 1974, Robert Merrill King 6653 (Holotype US).

The new species is most similar to P. pittieri (R.M.King) R.M.King & H.Robinson but differs by the somewhat acuminate leaf tips and the smaller number of narrower more acute involucre bracts. The new species is from an area draining eastward into the Amazonian basin. The related P. pittieri is presently known only from areas draining westward or to the north. The Ecuadorian collection of P. pittieri is, nevertheless, close to the locality for P. ecuadorensis and the distributions may prove to overlap.

Phalacraea latifolia A.P.Decandolle, Prodr. 5:106. 1836. Peru.

Phalacraea pittieri (R.M.King) R.M.King & H. Robinson,
comb. nov. Piqueria pittieri R.M.King, SIDA 3:
107. 1967. Colombia, Ecuador.

The species was originally described from Colombia.
A second collection seems to represent this species
from Ecuador: Chimborazo: southeast of Joyagshi along
Sibambe-Tambo R.R., alt. 9,900 ft., Wiggins 10714 (US).

Acknowledgement

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Phalacraea ecuadorensis R.M.King & H.Robinson,
Holotype, United States National Herbarium. Photos by
Victor E. Krantz, Staff Photographer, National Museum
of Natural History.



Phalacraea ecuadorensis R.M.King & H.Robinson,
Holotype, enlargement of heads.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXI.

A NEW GENUS, GUEVARIA.

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The genus Piqueria was one of the formula genera that have been recognized in the Eupatorieae and like others it has proven to be unnatural. The genus was maintained for species having no pappus and no anther appendage though it did at one time include a few appendaged species now properly placed in Ageratum. Recent investigations have shown that two groups in Mexico placed with Piqueria had relationships to completely different groups, Erythradenia to Decachaeta, Piqueria standleyi B.L.Robinson to Koanophyllon. The South American subgenus Artemisioides DC. has proven to belong to the very different genus Ophryosporus. The remaining elements retain many features in common and might prove a natural though highly diverse group. There are also some genera that must be considered in relation to the group that have not been included in previous treatments.

The present effort involves an evaluation of the genera related to Piqueria and the description of one of these, Guevaria, as new.

As delimited in the present study the relatives of Piqueria share a number of characters including the herbaceous habit, subequal phyllaries, corollas with distinct tubes and abruptly broader limbs, lobes covered with papillae on the inner surface, cells of the anther collars densely ornamented with annular thickenings, a usually reduced anther appendage, an unenlarged glabrous style base, a papillose often slightly broadened stylar appendage, and a reduced pappus. Many members of the group also have a contorted base of the achene. As such the group is notable for containing some of the most minute members of the Asteraceae and certainly the smallest of the Eupatorieae, Piqueriopsis, Iltisia, and Ferreyrella.

A genus that seems close to the Piqueria group is Phania with a short squamose pappus and a short anther appendage. The true relationship of Phania seems clearly to Ageratum, however, and at least some features such as the reduced anther appendage seem to be parallelisms.

Another genus of questionable relationship is Ascidiogyne (Cuatrecasas, 1965) with its inflated fluid filled outer layer of the achene. The pappus is present, forming a short crown, and the inner surfaces of the corolla lobes seem nearly smooth.

Two genera that belong to the group are Iltisia and Microspermum which have well-developed anther appendages. The latter is distinctive for the greatly expanded ray-like peripheral flowers of the heads and some species have a vestigial pappus. The genera have been placed in the Helenieae, an error corrected by Rzedowski (1970). These genera seem specialized within the Piquerinae, however, and not transitional from a Helianthian ancestor as suggested by Rzedowski.

Ellenbergia (Cuatrecasas, 1964) is a monotypic genus of Peru that is very similar to species placed here under Guevaria but there is a pappus of numerous short narrow tapering setae and the anther filaments consist almost entirely of the collar. The species has also been described as Piqueria setifera Chung (1967).

The two oldest names in the Piquerinae prove to represent the two most distinctive remaining elements. Piqueria, primarily of Mexico differs from other genera by heads with 3-5 phyllaries and an equal number of flowers, papillose filaments, and sparse punctations in the achene wall. Phalacrea of northern Andes is most distinct in the many flowered heads with plain to slightly convex receptacles, the short-acute phyllaries, the almost exclusively glandular hairs on the corolla, the numerous setae on the achenes, and the often attenuate bases of the achenes with small carpopodia. These differences are sufficient to raise the question of parallelism in other characters. The phyllaries and the carpopodia seem particularly significant in Phalacrea though the carpopodial structure is approached in one species of Piqueria.

The remaining genera of the complex seem to form the only unquestionably related series. These genera include Guevaria and Ferreyrella of the Andes, Piqueriopsis of Mexico and Piqueriella even farther away in eastern Brazil.

The four genera share the blunt involucre bracts, corolla shape and most features of the achene and seem unquestionably related. The peruvian genus, Ferreyrella, consists of two very small erect species with paleaceous receptacles. Paleae are found in no other genus of the Piqueria group. The two species are notable for more variation in size of the anther appendage than is seen in any related genera. The small genus, Piqueriopsis, is a close relative native to

Michoacan in Mexico. The Mexican genus is a minute erect plant distinguished by the 8-10 ribs on the achenes and the tetramerous corollas. The anther thecae are particularly short and broad. The remaining two genera, Piqueriella and Guevaria, seem particularly closely related but differ by a number of significant characters. The former genus, consisting of a single species, has rather few-flowered heads and scarcely convex receptacles, glabrous corolla tubes, single very short appendages on each anther and an erect plant base from a short tap-root. The group of 4 species in the Andes that is placed here in the new genus, Guevaria, has larger heads with mostly conical receptacles, corolla tubes with many mostly non-glandular hairs, anther appendages totally vestigial and bases of the plants decumbent.

Guevaria R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae decumbentes sensim erectae herbaceae vel suffrutescentes usque ad 4 dm altae paucè vel multo ramosae. Folia opposita angustè saepe breviter petiolata, laminis ovatis crenulatis vel serrulatis trinerviatis supra pilosis subtus pilosis et minute puberulis saepe glandiferis. Inflorescentiae laxè subcymosae, pedicellis glandulis stipitatis obsitis. Capitula late campanulata; flores 15-40. Squamae involucri 10-20 2-3-seriatae subaequales lata apice rotundata vel subtruncata vel apiculata; receptacula conica glabra. Corollae albae breves base distincte tubulosae, tubis dense hirsutis, pilis multiseptatis plerumque non glanduliferis, limbis breviter late campanulatis, lobis 5 subaequilateraliter triangularibus intus et margine dense papillosis extus breviter piliferis vel glanduliferis, parietibus cellularum sinuosis; filamenta antherarum laevia in parte superiore vix incrassata, cellulis plerumque brevibus obscuris, parietibus valde transverse annulatis; cellulae exotheciales subquadratis, appendicibus nullis vel subnullis; styli inferne glabri non nodulosi, appendicibus late linearibus dense longe papillosis; achaenia prismatica obovata 5-costata glabra; carpopodia valde asymmetrica, cellulis 2-5-seriatis plerumque elongatis; pappus nullus. Grana pollinis sphaerica ca. 18 μ diam. breviter spinosa.

Species typica: Piqueria sodiroi Hieron ex Sod.

Our studies of the genus indicate that it contains the following four species.

Guevaria alvaroi R.M.King & H.Robinson, sp. nov. Plantae decumbentes sensim erectae usque ad 65 cm altae herbaceae vel suffrutescentes pauca ramosae. Caules fulvescentes teretes striati puberuli vel hirtelli. Folia opposita, petiolis 2-10 mm longis; laminae ovatae vel deltoideae usque ad 2.7 cm longae et 2.0 cm latae base truncatae vel late cuneatae trinervatae margine multo crenato-serratae apice breviter subacutae vel anguste obtusae supra sparse puberulae et breviter pilosae subtus dense glandulo-punctatae plerumque in nervis hirtellae. Inflorescentiae subcymosae, pedicellis plerumque 2-8 mm longis dense albo-puberulis. Capitula ca. 3 mm alta; flores ca. 40; squamae involucris ca. 15 eximbricatae 2-3-seriatae subaequilongae late ellipticae 1.5-2.0 mm longae usque ad 1 mm latae apice late rotundatae breviter bicostatae extus sparse perminute puberulae vel glabrae margine distincte breviter fimbriatae; corollae ca. 1.5 mm longae, tubis valde distinctis ca. 0.3 mm longis inferne longe pilosis nonglanduliferis superne glandulis breviter stipitatis obsitis, limbis late abrupte campanulatis, lobis ca. 0.5 mm longis parum longioribus quam latioribus intus et margine dense papillosis extus pauca glandulo-punctatis superne breviter hirsutis; filamenta antherarum in parte superiore ca. 100 μ longa; thecae ca. 450 μ longae; achaenia ca. 1.25 mm longa obovata glabra; carpopodia 100-200 μ longa, cellulis oblongis ca. 10 μ latis. Grana pollinis ca. 20 μ diam.

Type: ECUADOR: Asuay: along the road to Giron, ca. 11 kms NE of Giron. Elevation ca. 8,900 ft. February 3, 1974, Robert Merrill King 6673 (Holotype US).

The new species is closely related to Guevaria sodiroi but that differs by the much smaller straggling habit and the more puberulous to piliferous outer surfaces of the involucre bracts. The other ecuadorian species, G. loxensis, has the more erect habit of G. alvaroi but has generally larger more coarsely crenate leaves with more cuneate bases and more obovate involucre bracts with more truncate slightly scarious apical margins. The peruvian G. Vargasii is much less closely related and can be easily distinguished by the mostly or completely alternate leaves.

The genus and species are both named for Mr. Alvaro E. Guevara of Austin, Texas, who has helped the senior author on a number of collecting trips.

Guevaria loxensis (Blake & Steyermark) R.M.King & H. Robinson, comb. nov. Piqueria loxensis Blake & Steyermark, Journ. Wash. Acad. Sci. 40:47. 1950. Ecuador.

Guevaria sodiroi (Hieron. ex Sod.) R.M.King & H. Robinson, comb. nov. Piqueria sodiroi Hieron. ex Sod., in Engl. Jahrb. 29:3. 1900. Ecuador.

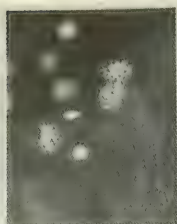
Guevaria vargasii (Chung) R.M.King & H. Robinson, comb. nov. Piqueria vargasii Chung, Phytologia 14:325. 1967. Peru.

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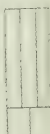
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Acknowledgement

This study was supported in part by the National Science Foundation Grant BMS 70-00537 A04 to the senior author. Field work in Ecuador was supported by a grant from the National Geographic Society, Washington, D. C.



PLANT OF ECUADOR



PLANT OF ECUADOR



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PLANT OF ECUADOR

PLANT OF ECUADOR

Guevaria alvaroi R.M.King & H.Robinson, Holotype,
United States National Herbarium. Photos by Victor E.
Krantz, Staff Photographer, National Museum of Natural
History.



Guevaria alvaroi R.M.King & H.Robinson, Holotype,
enlargement of heads.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXIII.

A NEW GENUS, PIQUERIELLA.

R. M. King and H. Robinson
Smithsonian Institution, Washington, D.C. 20560.

A collection of a previously undescribed species from extreme eastern Brazil represents a disjunct member of the group of Eupatorieae previously known under the broad genus name, Piqueria. The group is noted for the lack of pappus on the achene and by the anther appendage being reduced or absent. Recent studies have refined the concept of Piqueria and removed many rather unrelated groups such as Erythradenia, Koanophyllon standleyi and a series of Ophryosporus species. The more related elements of Piqueria have also proven very diverse with typical Piqueria having papillose anther filaments, more sparsely punctate achene walls and a reduced number of both flowers and involucre bracts. The Brazilian and all of the Andean species are among the elements excluded from Piqueria in this more natural delimitation.

The actual element to which the Brazilian material is most closely related is the newly described genus, Guevaria, of the northern Andes. The Brazilian species is distinct from Guevaria, however, in a number of significant characters including the erect bases of the plants rather than decumbent, the fewer flowered heads with scarcely convex rather than conical receptacles, the glabrous corolla tubes rather than tubes bearing many non-glandular hairs, and anthers with a single very short broad appendage rather than two almost non-appendiculate lobes. The geographical isolation reinforces the distinction seen in structural features. On this basis the new genus Piqueriella is established here for the Brazilian species.

Piqueriella brasiliensis R.M.King & H.Robinson, gen.

et sp. nov. Plantae erectae herbaceae usque ad 60 cm altae subperennes? paucè ramosae. Caules virides vel fulvescentes teretes leniter striati glandulis longiuscule stipitatis obsiti. Folia plerumque opposita anguste petiolata, petiolis 3-16 mm longis; lamina ovata papyracea usque ad 6 cm longa et 3.5 cm lata base late cuneata trinervata margine grosse multo dentata apice breviter anguste acuminata

supra sparse pilosa subtus sparse minute glandulifera in nervis sparse pilosa. Inflorescentiae laxae subcymosae, ramis glandulis longiuscule stipitatis obsitis, pedicellis 2-4 mm longis minute puberulis. Capitula ca. 2-5 mm alta; flores ca. 8; squamae involucris ca. 6 biseriatae aequilongae late oblongae vel obovatae ca. 1.5 mm longae et 1 mm latae apice subtruncatae 3-5 denticulatae extus glabrae; receptacula plana vel leniter convexa. Corollae albae? 1 mm longae glabrae base distincte tubulosae, tubis ca. 0.3 mm longis, limbis late campanulatis, lobis 5 ca. 0.4 mm longis subaequilateraliter triangularibus intus et margine dense papillois, parietibus cellularum sinuosis; filamenta antherarum laevia in parte superiore vix incrassata ca. 130 μ longa, cellulis plerumque brevibus obscuris, parietibus valde transverse annulatis; thecae ca. 0.5 mm longis, cellulis subquadratis, appendicibus distinctis 120-150 μ latis et 30 μ longis; styli inferne glabri non nodulosi, appendicibus breviter subclavatis dense longe papillois; achaenia prismatica obovata ca. 1.3 mm longa 5-costata glabra; carpopodia valde asymmetrica, cellulis 2-3-seriatis plerumque elongatis; pappus nullus. Grana pollinis sphaerica ca. 18 μ diam. breviter spinosa.

Type: BRAZIL: Ceará: Serra de Baturité, Bico Alto, cume, August 17, 1908. A. Ducke s.n. (Holotype RB, Isotype US).

Acknowledgements

This study was supported in part by the National Science Foundation Grant BMS 70-00537 A04 to the senior author. We wish to thank Dr. Graziela M. Barroso of the Jardim Botânico do Rio de Janeiro for making the material available for our study



Piqueriella brasiliensis R.M.King & H.Robinson,
Holotype, United States National Herbarium; habit
and enlargement of heads. Photos by Victor E. Krantz,
Staff Photographer, National Museum of Natural History.

BOOK REVIEWS

Alma L. Moldenke

"PRINCIPLES AND TECHNIQUES OF ELECTRON MICROSCOPY: Biological Applications" by M. A. Hayat. Volume I. xv & 412 pp., illus. 1970; Volume II, xvii & 286 pp., illus. 1972. Van Nostrand Reinhold Company, New York, N. Y. 10001. \$19.50 each.

"The primary objective of this book is to provide the reader with the foundation in biochemical concepts governing the preparatory procedures.....[so as to] help in better understanding the electron micrograph of a specimen, which has been subjected to fixation, dehydration, embedding, sectioning, staining and electron bombardment." After this scientific, rather than cookbook, orientation in Volume I the author explains the accomplishment of each of these steps along with their aberrations. There are outlined on three pages "Defects appearing during sectioning" and their possible causes and remedies. Much of this information and explanation are applicable also to preparations for the light microscope. The Appendix provides fixation and buffer procedures, supply distributors and bibliography.

For Volume 2 M. A. Hayat is actually the editor of the contributions of nine different writers but the writing style remains remarkably uniform, clear-cut, and is effectively illustrated like the first volume is. It covers freezing technology by freeze-drying, freeze-substitution, and freeze-etching techniques and interpreting the images, negative staining, shadow casting and replication, shadowing and high resolution, and autoradiography as an emerging "cytochemical tool.....employed to localize and quantify [with poison statistics] radioactive material at submicroscopic levels". This volume is also provided with references and index.

These writings will prove of real value to many in the teaching profession, to advanced students, technicians and many kinds of biologists whose research problems require or can be assisted by E M.

"ECTOMYCORRHIZAE: Their Ecology and Physiology" edited by G. C. Marks & T. T. Kozlowski, xiv & 444 pp., illus., Academic Press, London NW 1 & New York, N. Y. 10003. 1973. \$28.50.

This is an interesting and valuable volume of ten papers in the Physiological Ecology Series. It discusses morphology, morphogenesis, classification, native and man-made forest distribution, growth around seeds and roots, mineral nutrition, carbohydrate acquisition usually as simpler sugars, growth-regulating hormonal influence on roots, interrelationships with the microbially rich rhizosphere and with feeder root diseases, and the application of these symbioses to forestry practice.

The mycorrhiza (ecto, endo or both) develop after a fungus — usually a soil basidiomycete — enters the living primary cortical root cells — of certain trees especially — in this limited zone and progresses acropetally as the root grows. Might they protect the associated roots from absorbing phytotoxins in the surrounding soil as suggested by Zak?

Bibliographies are provided with each paper. Author and subject indexes are provided. Usually Academic Press publications of this type also include an organism index too: it is missing here. Even if the nomenclature of these fungi leaves very much to be desired, fungal names are used as are host plant names. At least p. 81 lists phanerogamic genera reported with ectomycorrhiza.

While the most obvious orientation of this book is towards forestry, mycology and soil microbiology, many more fields with their students, teachers, technicians, research workers, and interested readers are involved, as, for instance, phytopathology, phytophysiology, horticulture, ecological edaphology, biochemistry, etc.

"A TRAVELLER'S GUIDE TO NORTH AMERICAN GARDENS" by Harry Britton Logan, vii & 253 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1974. \$15.00.

Since the title makes the contents self evident there is no explanatory introduction, there is just the listing alphabetically by states most of the outstanding — botanically, horticulturally, arboretically, artistically — gardens. They are show and/or study places of native and/or exotic well cared-for plantings. They vary tremendously in size and type of ownership and operation. They all share in common the well deserved publicity that this book offers and the privilege of being illustrated by superb black/white photograph prints. A few are also shown in exquisite color.

The main features of orientation and for seasonal changes, the addresses, admission hours, costs (if any) and other admittance policies for nearly 1,300 gardens are all included in well organized compact form along with those inviting photographs. There are listings of specialized plant societies with their addresses and of State Tourist Bureaus with their addresses, and an index.

For this type of reproduction the book is amazingly inexpensive and it has so many different uses from coffee table conversation piece, to general and horticultural library reference, to tour planners for special interest groups, to gift-giving for garden clubbers who have done some travelling, hope to or wish they could, since along with our mainland states, Canada, Hawaii, the Virgin Islands and Puerto Rico are also included.

"BIOGENESIS OF PLANT CELL WALL POLYSACCHARIDES" edited by Frank Loewus, xi & 379 pp., illus., Academic Press, London NW 1 & New York, N. Y. 10003. 1973. \$14.00.

These are the proceedings of the Symposium on this topic which was featured at the 164th National Meeting of the American Chemical Society through its Cellulose, Wood and Fiber Section and was held in New York City in 1972. The 17 papers have been reproduced here by a neat rapid photo offset process after uniform varityping.

The topics considered include the myo-inositol oxidation pathway to polysaccharides, carbohydrate polymers, formation of UDP-D-glucuronic acid, glycopeptide linkages of extensin, hydroxyproline-rich glycoproteins, modified (fibrillar) polygalacturonic acid, etc., from a wide range of plants that are not major crop or pest organisms but rather on Wolfiella, Porphyridium, Pleurochrysis, etc. There is a group of pollination papers dealing with stylar transmitting tissues' intercellular substance, pistil secretion and pollen tube wall formation, and pollen enzymes involved in sugar nucleotide formation — all leading to such interesting questions that may be answerable soon.

These studies seem to be carefully executed, well reported, and documented with their individual bibliographies.

"MUSHROOMS IN THEIR NATURAL HABITATS" by Alexander H. Smith, xiv & 626 pp., illus., Replication Edition by Hafner Press, Division of Macmillan Company, New York, N. Y. 10022. 1973. \$14.95.

This is a facsimile copy of the original Volume I of 1949 with its very detailed descriptive text originally planned to accompany the other volume with its color photographs. Present day color photography and its printing so widely practiced by amateur and professional are so superior now that repetition of the older plates would really be wasteful. But making easily available again the excellent, accurate and thorough notes of this lifetime mycologist/author is really wonderful for the student, the professional and the serious amateur. For each species the scientific name and synonyms with sources, general discussion, edibility, habit, habitat, distribution and technical description are given.

There are also several clearly written chapters on general features of mushrooms that should help the formal student to learn and enjoy and the mycophile to enjoy and learn.

"PYRETHRUM — The Natural Insecticide" edited by John E. Casida, xvii & 329 pp., illus., Academic Press, London NW 1 & New York, N. Y. 10003. 1973. \$16.00.

This needed and comprehensive collection of papers comes from

the "International Symposium on Recent Advances with Pyrethrum the Natural Insecticide" at the 25th Anniversary meetings of the American Institute of Biological Sciences at the University of Minnesota in 1972.

"Pyrethrum was in use in Europe as an insecticide more than a century ago and in Persia considerably earlier" and was taken from the dried "insect flower" heads of Chrysanthemum cinerariaefolium (Treviranus) Boccone. The extractable pyrethrins consist of closely related insecticidally active esters of sesquiterpenes flavonoids, triterpenols and sterols, alkanes, fatty acids and carotenoids. These biodegradable contact poisons are usually effectively enhanced with such a synergist as piperonyl butoxide, but the biochemical or biophysical mechanisms of the insecticidal action are not yet defined.

Camougis provides an interesting diagram of proposed relationships among various events in the nervous system of arthropods following exposure to pyrethrins.

Available toxicity data provide no evidence that pyrethrins are carcinogenic, teratogenic, mutagenic, or toxic to warm-blooded animals within normal dosages, but more long-term studies are needed.

Between the covers of this one reasonably priced book are many scientifically correct answers and reliable directions that offer real help to people in many walks of life who have to deal with problems of pesticides "which are burdened with emotions, pressures, court instructions, the necessity of making quick decisions — sometimes too hasty and even faulty, as a result of the absence of sound and reliable information."

"PLANT SUCCESSION AND INDICATORS — A Definitive Edition of Plant Succession and Plant Indicators" by Frederic E. Clements, xvi & 453 pp., illus., Replication Edition by Hafner Press, Division of Macmillan Company, London & Toronto, Ontario, & New York, N. Y. 10022. 1973. \$14.95.

With the growing and sustaining interest in ecology, the return of this book to personal, laboratory, school and university library shelves should be appreciated because of the many facts and ideas presented herein. This material was first published in 1916 as the Carnegie Institution Report 242 and was then combined with the "Plant Succession" report of 1920 and condensed for publication in 1928 and ever since then it has been much used and highly valued. It is this edition which is the facsimile source of this new edition.

Ah, if only Hafner had seen fit to add an organism index! Of course, this lament was voiced, sighed or thought by several busy botanists checking the book for certain specifics at various times since 1928.

"COMPARATIVE MORPHOLOGY OF VASCULAR PLANTS" by Adriance C. Foster & Ernest M. Gifford, Jr., Second Edition, ix + 751 pp., illus. 1974. \$17.00.

The very fine first edition of this work came from the presses 15 years ago and became a classic in its field, and so will this edition surely be.

The older type course in plant anatomy prosaically presented through the groups started fading away even by the time of the first edition; but the plants and the intellectual need to seek interpretations for things seen (or distorted) by means of electron microscopy and with the newer preparation techniques fortunately do not fade. The courses get different orientation and names. And so there is a need now for this well revised book.

Prominent among the advances of this edition are (1) the indication that the Devonian "Psilophytales" represent three parallel lines of evolutionary specialization (instead of only one) among early vascular plants, (2) the recognition of Archaeopteris and other Paleozoic progymnosperms (relegating the Pteropsida taxon to synonymy), (3) the greater emphasis on morphogenesis (especially in ferns) and cytological ultrastructure, (4) additional bibliography, and (5) to the many of the original illustrations have been added many new outstanding fine photographs, line drawings and diagrams relating to such newer materials.

"DORLAND'S ILLUSTRATED MEDICAL DICTIONARY" — 25th Edition edited by John P. Friel, xl + 1748 pp., illus., W. B. Saunders Co., Toronto M8Z 5T9, London WC1A 1DB & Philadelphia, Pa. 19105. 1974. U.K.: £9.15 Standard & £12.15 Deluxe, Canada: \$22.15 Standard & \$29.35 Deluxe, U.S.A.: \$21.50 Standard & \$28.50 Deluxe.

Starting at the beginning of this century and through each of its new editions this careful compilation continues to be an outstandingly helpful, accurate and up-to-date general dictionary for medical science and its peripheral fields. Consequently it should be very useful, not only to physicians themselves since the field covered is so broad, to medical, premedical, biology, biochemistry, etc. students, and to educated families.

There are 62 detailed plates of detailed anatomical structures mainly, but also of viruses, splints, sutures, etc. There are 26 detailed tables of ligaments, blood vessels, nerves, naturally occurring amino acids, venomous snakes, etc. An excellent introductory article on medical medical entomology, careful cross-referencing without wasteful repetitions, and other features enhance the value of this edition.

"STRUCTURE AND FUNCTION OF CHLOROPLASTS" edited by Martin Gibbs, xiv & 286 pp., illus., Springer-Verlag, Heidelberg & Berlin & New York, N. Y. 10010. 1971 [1972]. \$22.60.

This book is composed of nine carefully prepared, non-repetitive papers surveying the field concisely and effectively by ten contributors including the editor. The following subjects are considered:

(1) A 100-year historical survey of photosynthesis, (2) the ultrastructure of all kinds of plastids, (3) light-induced chloroplast contraction and movement, (4) plastid inheritance and mutations as shown by the variegated plastome mutants in Antirrhinum, Nicotiana, Arabidopsis, Epilobium, and Zea mays, (5) nucleic acids and information processing in chloroplasts which "contain systems capable of forming DNA, of using a DNA template for the synthesis of RNA and of using polyribonucleotides as templates for the incorporation of amino acids into polypeptides", (6) lipids of chloroplasts, (7) biochemistry of photophosphorization which serves as a general energy-pool for many cellular processes, (8) carbohydrate metabolism by chloroplasts through its autotrophic phase in which CO₂ is converted to a phosphorylated hexose, (9) biosynthesis by chloroplasts of such secondary products as proteins, lipids and such pigments as a & b chlorophylls and carotenoids, quinones, polyprenols, sterols, terpenoids and of the fruit maturation changes into chromoplasts.

Each chapter is well supplied with bibliography. There is a general index. The charts, diagrams and EM photographs are helpful. The work provides an excellent survey of this topic.

"MYCOTAXON — An International Journal Designed to Expedite Publication of Research on Taxonomy & Nomenclature of Fungi & Lichens" co-edited by Richard P. Korf and G. L. Hennebert, P. O. Box 264, Ithaca, New York 14850. Vol. 1, No. 1, 64 pp., illus., July–September 1974. \$6.00 — \$16.00 per volume by subscription.

Somewhat similar in format, systematics orientation, and offset printing to "PHYTOLOGIA", this new botanical journal, with numbers to appear quarterly and with each volume consisting of 256 or more pages, is hereby formally welcomed and well-wished.

Dr. Korf is the managing and English language editor, while Dr. Hennebert is the French language and book review editor who can be addressed at Huttelaan 36, B-3030 Heverlee, Belgium.

This first issue describes the function and policies of MYCOTAXON, prospective authors' instructions, and subscription details, including some new ideas. The major part is devoted to taxonomic papers on Massospora from cicadas, a new Lomentospora from greenhouses, and the retention of Lasiostictis and Bisporella as resurrected older names.

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SOME HELENIROID COMPOSITAE FROM CENTRAL AMERICA

Louis O. Williams

Field Museum and Escuela Agrícola Panamericana

The tribe Helenieae of the Compositae is not greatly different from the tribe Heliantheae, and by some botanists the two are joined. The Guatemalan genera of the tribe Helenieae seem to be fairly distinct from the helianthoid kinds, so as a matter of convenience the tribe Helenieae will be maintained in the Flora of Guatemala. The tribe is a small one in Guatemala, 12 genera and 32 species. Very few additional species are known from the other Central American countries.

The field and herbarium work involved in the preparation of the Helenieae for the Flora of Guatemala, and for preliminary notes on Guatemalan and Central American kinds, has been generously supported by the National Science Foundation, to which our sincere thanks are given.

DYSSODIA DECIPIENS (Bartling) M. C. Johnston, Rhodora 64: 13. 1962; Strother, Univ. Cal. Publ. Bot. 18: 25. 1969. Syncephalantha decipiens Bartling, Ind. Sem. Hort. Goett. 1836: 6. 1836; Schlechtendahl, Linnaea 12: Lit. Ber. 80. 1838. S. sanguinea Klatt, Leopoldina 25: 106. 1889. S. macrophylla Klatt, l. c. 108. Dyssodia sanguinea Strother, l. c.

The genus Syncephalantha was based by Bartling on plants grown from seeds received from Karwinski. Karwinski spent five years in Mexico, principally in Oaxaca, and it may be assumed that the seeds which he collected of this attractive plant came from there. Klatt, in 1889, described two additional species of Syncephalanthus, a variant spelling of the generic name. Syncephalanthus sanguineus was described from a Warszewicz collection, number 87 "Hab. Guatemala et Costarica." Since the species is not known from Costa Rica and is abundant in Guatemala, I assume that the collection was made in Guatemala. Syncephalanthus macrophyllus was grown in the Berlin Botanical Garden from material of unspecified origin.

Strother in his study of *Dyssodia* has maintained both *Dyssodia decipiens* and *D. sanguinea*. However the collections available to me in Field Museum, 4 from Oaxaca, 4 from Chiapas and about 40 from Guatemala, seem to me to represent a single species, and will be so treated in the Flora of Guatemala.

ESPEJOA MEXICANA DC. Prodr. 5: 660. 1836. *Jaumea mexicana* Benth. & Hook. ex Hemsl. Biol. Cent. Am. Bot. 2: 209. 1881.

There is a single species in this genus, *E. mexicana* DC., which is found from Mexico south to Nicaragua. The species sometimes has been referred to *Jaumea*, as was done by Hemsley and by Bentham and Hooker. I have seen inadequate material of *Jaumea linearifolia* Pers. (the type species of *Jaumea*) from the sea coast of Argentina and Uruguay, but that seen seems to indicate that *Espejoa mexicana* does not belong in the same genus.

HELENIUM INTEGRIFOLIUM (HBK.) Benth. & Hook. ex Hemsl. Biol. Cent. Am. Bot. 2: 227. 1881

A common plant in the high subalpine meadows of the Cuchumatanes mountains in Guatemala, extending well north in Mexico. These meadows are badly overgrazed by sheep, but this *Helenium* is not grazed and is said locally to be poisonous to sheep. We have no proof that this is so, but for some reason the plant is not palatable to sheep.

Helenium scorzoneraefolium (DC.) Gray is a very closely related species to be expected in Guatemala, for it is known close by in Chiapas.

These two species have often been placed in different genera,— by Rydberg in North American Flora one in *Dugaldia* and the other in *Hecubaea*. However, the differences between the two, even at specific level seems minor to me.

PECTIS MULTIFLOSCULOSA (DC.) Sch.-Bip. in Seem. Bot. Voy. Herald 309. 1856. *Lorentea multiflosculosa* DC. Prodr. 5: 102. 1836. *Pectis arenaria* Benth. Bot. Voy. Sulphur 110. 1846. *Cheilodiscus littoralis* Triana, Ann. Sci. Nat. ser. 4. Bot. 9: 36. 1858. *Pectis bibracteata* Klatt, Leopoldina 20: 92. 1884. *P. grandiflora* Klatt, Leopoldina 1895: 6. 1895; Bull. Soc. Bot. Belg. 35: 290. 1896. *P. lehmannii* Hieron. in Engler, Bot. Jahrb. 28: 620. 1901.

An interesting strand plant that occurs along Pacific shores from a bit farther north than Acapulco, Mexico, to Tumbes on the northernmost coast of Peru. I have seen no specimens from Guate-

nala but my associate, Prof. Antonio Molina R., tells me that it is abundant along the beach at Champerico. The species is known from a single collection each in El Salvador, Honduras and Nicaragua, and from several Costa Rican collections. It is to be expected in Panama, but I have seen no specimens.

Photographs of types or authentic material are available at the Field Museum of: Lorentea multiloboculcea (20718); Cheilodiscus littoralis (38045); Pectis bibracteata (22605); and Pectis lehmannii (15472).

SCHKUHRIA VIRGATA (Llave & Lex.) DC. Prodr. 5: 654. 1836. Mieria virgata Llave & Lex. Nov. Veg. Deser. 2: 9. 1825. Horkirkia anthemoidea DC. Prodr. 5: 660. 1836. Tetracarpum anthemoideum Rydb. N. Am. Fl. 34: 45. 1914. T. guatemalensis Rydb. l. c. T. virgatum Rydb. l. c. Schkuhria guatemalensis Standl. & Steyerl. Field Mus. Bot. 22: 319. 1940. S. pinnata (Lam.) O. Kuntze var. virgata Heiser, Ann. Mo. Bot. Gard. 32: 271. 1945. S. anthemoidea var. guatemalensis Heiser, l. c.

Distributed from Arizona through Mexico, and in Central America south to Nicaragua.

I am unable to distinguish satisfactorily the common, and often weedy, Schkuhria of Mexico and Central America into the varieties under two species, as was done by Heiser in his revision of the genus. The distinction of S. anthemoidea and its variety guatemalensis is difficult and the characters used for separation seem very weak. The plants found under these names seem to differ in no consistent way from plants determined by Heiser as S. pinnata var. virgata. The number of flowers in a head, whether 5 or fewer or 5-8, and the comparative villosity of the angles of the achenes are tenuous characters and not consistent. I believe that the South American material of S. pinnata (Lam.) O. Kuntze that I have seen is distinct from the North American material, which I am calling S. virgata, the oldest name for this complex in North America.

TAGETES IN GUATEMALA. Most specimens of Tagetes in our collection were studied and annotated in 1957-58 by Robert T. Neher. His studies have not been published.

There are two complex groups of Tagetes in Guatemala, both of them sometimes weedy. One group comprises the cultivated marigolds, Tagetes erecta L., with possible synonyms of T. patula L. and T. remotiflora Kunze. There seems to be intergression between what seems to me to be primitive T. erecta (perhaps represented by the name T. remotiflora) and T. tenuifolia,

the commonest Tagetes in Guatemala. Tagetes erecta is widely cultivated and escaped in Guatemala, as in most of the rest of Central America. The primitive form is apparently native in Mexico and Guatemala, but not on southward. The second complex centers around Tagetes foetidissima DC., a species which occurs from middle to highest elevations in Mexico, Guatemala, and south to Costa Rica. It is possible that there may be intergression between T. foetidissima and T. tenuifolia. A species very like T. foetidissima is T. multiflora HBK., abundant in the Andean countries. I suspect that these two names may represent one complex and variable species. At best they are two very closely related species.

TAGETES NELSONII Greenm. Proc. Am. Acad. 39: 117. 1903;
Contr. Gray Herb. n.s. 25: 117. 1903. T. sororia Standl. &
Steyerm. Field Mus. Bot. 23: 146. 1944.

One of the commonest of the native marigolds of the western highlands of Guatemala. In adjacent Chiapas, Mexico, it is probably also common, but there are relatively few collections to indicate this. The type is from near Tumbala, Chiapas.

The plant is sometimes suffrutescent, but usually herbaceous, up to 2 meters tall, and the better forms of it are most attractive. One of the finest examples of this species can be found along the stone fences that surround Indian dwellings and fields on the road to the Sierra de los Cuchumatanes, near the lookout (El Mirador) at about 3,000 meters elevation. This area is a few kilometers north by airline and 1,100 meters above the city of Huehuetenango.

A NEW HINTONIA (RUBIACEAE) FROM COSTA RICA

Donald R. Simpson
Field Museum of Natural History

The genus *Hintonia* (tribe Condamineae) when proposed by Bullock (1935) contained four species and one variety distributed through Mexico from the southern parts of Sonora and Chichuahua to Yucatan and into the highlands of Guatemala. No new taxa have been added until the present, and although many new collections have accumulated since Bullock's publication, they have not appreciably extended the distribution range of the genus. The new Costa Rican species proposed below represents a major extension of that range.

HINTONIA PULCHRA D. Simp. sp. nov.

Arbor, 15 m. alta; ramulis glabris, leviter complanatis, ad nodos tumidis. Folium ellipticum vel anguste oblongum, apice basique longe attentuata, 7-12 mm. longo petiolo incluso 16.5-18 cm. longum, membranaceum vel chartaceum, glabrum; nervis secundariis utroque 6-8; stipulis peristentibus, brevissime subtriangularibus, cuspidatis, 2 mm. longa cuspidē 4 mm. longis. Flores ad quoque nodum bini (i.e. opposita et singulares in quoque axilla foliorum prodientes); sed duorum plerumque unus abortivus est; pedicellis ca. 17 mm. longis, ebracteatis, glabris; receptaculo glabro; lobis calycis quinque, anguste linearibus vel filiformibus, glabris, 27-30 mm. longis; corolla tubiformi, alba, ca. 27 cm. longa, ad basim ca. 6 mm. lata, versus apicem expansa usque 11 cm. ad partem latissimam; staminibus quinque, inclusis, antheris linearibus, 5-6 cm. longis, ca. 0.7 mm. latis; stylo stamen aequans, indiviso, stigmate indiviso, unilaterali, ca. 11 mm. longo. Capsula ca. 3.5 cm. longa, diametro 1.5 cm., oblonga, base acuta, apice rotundato obtuso, glabra, longitudinaliter 5-nervata et 5-costata; pedicello 2.2 cm. longo; lobis sepalorum persistentibus, 3.4 cm. longis, 1.5-2 mm. latis. Semena horizontaliter affixis, exalatis, clypeatus, diametro ca. 6 mm., 1.5-2.5 mm. crassa; testa granulariter indurata.

Tree 15 m. tall. Leaves elliptic to narrowly oblong 16.5-18 cm. long, membranous to chartaceous. Flower buds two at a node (i.e. borne singly in each leaf axil), but seemingly one of the two aborting; pedicel ca. 17. mm. long, bractless; receptacle glabrous; calyx lobes 5, narrowly linear or filiform, glabrous, 27-30 mm. long, corolla white, trumpet-shaped, ca. 27 cm. long, ca. 6 mm. wide below, 11 cm. wide at apex; stamens 5, included, anthers linear, 5-6 cm. long, ca. 0.7 mm. wide; style equaling the stamens, undivided; stigmatic surface ca. 3.5 cm. long by 1.5 cm. in diameter, oblong, base acute, apex rounded obtuse, glabrous longitudinally 5-nerved and 5-ribbed, the ribs and nerves alternating,

nerves slightly raised in dried material, ribs subulate; fruiting pedicel 2.2 cm. long, angled by the continuation of the capsule ribs down the pedicel almost to the base; sepal lobes persistent in fruit, 3.4 cm. long, 1.5-2 mm. broad. Seeds attached horizontally, not winged, flattened, shield shaped (i.e. one surface convex, the opposite concave), irregularly circular or somewhat angled in outline, ca. 6 mm. across by 1.5-2.5 mm. thick; seed coat uniformly granular-roughened, reddish brown in dried material.

Type: Burger & Liesner 7320 (holotype F, isotypes CR, US).

Costa Rica: Prov. Puntarenas; in forest near the air field about 5 km. west of Rincón de Osa, Osa Peninsula, alt. 50-200 m., 8°42'N, 83°31'W, Burger & Liesner 5438, 7320.

This species differs from others of the genus in the longer, membranous leaves, the very long trumpet-shaped corolla, and the wingless seeds. The single capsule available to me was unopened, but in opening it to examine the seeds, the wall tended to split along the septum as it characteristically does in the genus *Hintonia*.

Its ecological adaptation and floral biology are unknown but in general aspect the plant is suggestive of certain species of *Tocoyena* and *Randia* (viz. *T. guianensis* K. Schum., *R. ruiziana* DC., and *R. williamsii* Standl.). These are species of small trees or shrubs apparently adapted to the heavily shaded shrub layer of tropical, evergreen, rain forest. They produce only a few flowers at a time whose most striking features are the extremely long, tubular, white corollas, and often, the release of a strong fragrance in late evening. The combination of elongated corolla tube, light color, and very strong fragrance released in the evening are presumably adaptations to specialized pollinators, probably some of the species of lepidopterans that are most active at dusk.

The exceptional features found in this species, and especially the wingless condition of the seeds, would perhaps be interpreted by some taxonomists as reason for proposing a new monotypic genus. It has not been uncommon for specialists in the Rubiaceae to use the distinction "winged vs. wingless seeds" as a criterion for distinguishing taxa at the generic level. Hooker (1873, p. 8) even used it at the tribal level, separating the tribes Henriquezieae and Cinchoneae from the Condamineae, Rondeletieae, and Hedyotideae by the former having seeds winged or appendaged vs. seeds wingless in the latter three tribes. Few systematists would now consider a genus to be excluded from or included in one of these tribes solely on the basis of this difference. Of the recent specialists on the Rubiaceae both Brenekamp (1934) and Verdcourt (1958, pp. 229 & 244) have commented on the value of the seed wing in determining relationships between genera. However, I have found no

discussion of the value of this feature as a criterion for delimiting a genus. There seems to be an implied assumption that variation from a winged to wingless condition does not occur in closely related species.

In fact, in the genus *Hintonia*, there is variation in the expression of several morphological features, including seed wing, which lends me to conclude that this new species does belong here. A series of variations toward the form of *H. pulchra* can be seen in *H. latiflora* var. *latiflora*, *H. latiflora* var. *leiantha*, and *H. lumaeanana*. For instance, leaf texture, shape, and size all vary from the short, ovate, subcoriaceous leaves of var. *latiflora* to the slightly longer, elliptic, subcoriaceous to membranous leaves of var. *leiantha*, to still larger, narrowly oblong, membranous leaves of *H. lumaeanana*. Although I have seen no seeds of *H. lumaeanana*, an excellent photograph of the type¹ shows seeds that are only narrowly winged and that more nearly approximate the size of the seeds of *H. pulchra* than of the other species of *Hintonia*.

Bibliography:

- Bremekamp, C. E. B. 1966. Remarks on the position, the delimitation and the subdivision of the Rubiaceae. *Acta Bot. Neerl.* 15:1-33.
- Bullock, A. A. 1935. *Hintonia latiflora* var. *leiantha* Bullock, in Hook. *Icon. Pl.* 33:t. 3295.
- Verdcourt, B. 1958. Remarks on the classification of the Rubiaceae. *Bull. Jard. Bot. Etat* 28(3):209-290.

1. Field Museum botanical "phototype collection," negative no. 37,197, of *M. G. Luma* s.n. (leg. 1878) in herb. P.

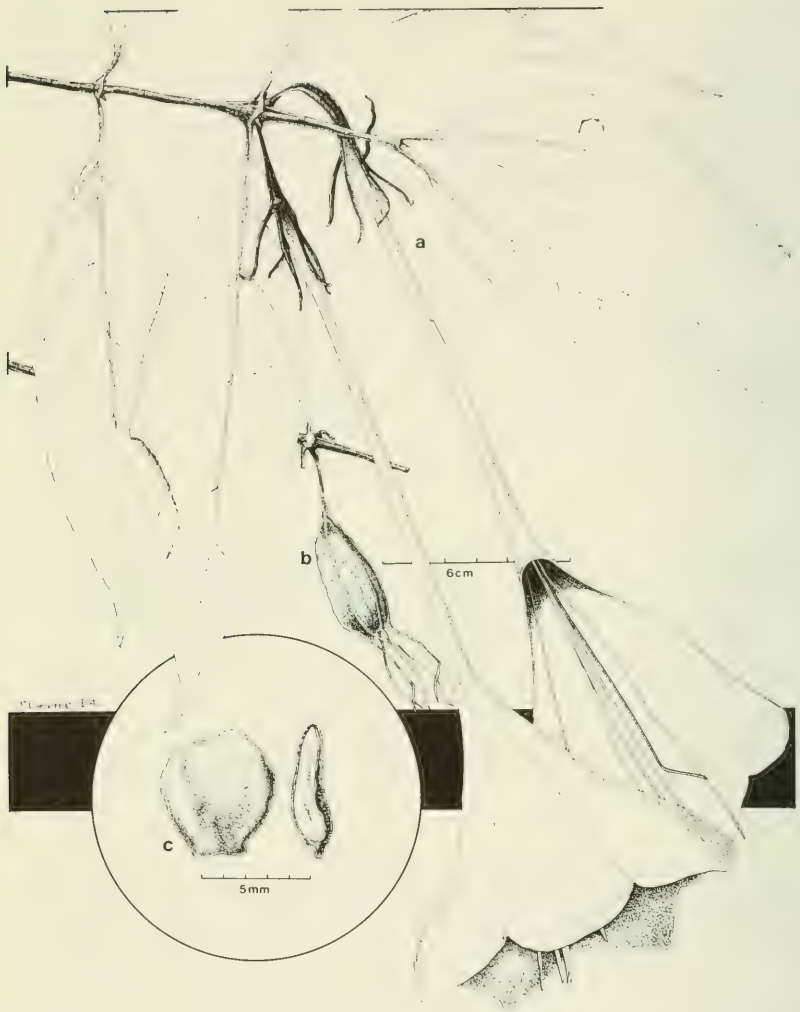


Plate I. *Hintonia pulchra* D. Simp. A, flowering branchlet with one flower showing cut-away view of anthers and style; B, branchlet with capsule (leaves removed); C, seed, lateral view and longitudinal section. Drawn by Richard W. Roesener.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. I

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional bibliography: Gomez de la Maza, Not. Bot. Sist. 49, 96, 104, 110, & 114. 1893; Gomez de la Maza, Jimenez, & Noig y Mesa, Fl. Cuba 9. 1914; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 143, 207, 229, 230, 275, 357, 406, 428, 429, 440, 454, 495, 585, 627, 636, 649, 664, 673, 735, 737, 778, 887, 976, 1003, 1085, 1102, 1120, 1121, 1124, 1228, vii, lii, & lvii. 1973; Faris, Irish Nat. Journ. 18: 93. 1974; Fitter, Fitter, & Elamey, Wild Fls. Brit. & N. Eu. 260, 261, & 290, fig. 9. 1974; Malaisse in Lieth, Phen. & Season. Model. 281--283 & 439, fig. 7c. 1974; Moldenke, Phytologia 29: 192--239. 1974.

BLASTOCAULON Ruhl.

Additional bibliography: Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 143. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 712 & 916. 1973; Moldenke, Phytologia 29: 81--82. 1974.

CARPTOTEPALA Moldenke

Additional bibliography: Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 207. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 710 & 920. 1973; Moldenke, Phytologia 29: 82. 1974.

Hutchinson (1973) reduces this genus to synonymy under Paepalanthus Mart.

COMANTHERA L. B. Sm.

Additional bibliography: Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 275. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 710 & 923. 1973; Moldenke, Phytologia 29: 82--83. 1974.

ERIOCAULON Gron.

Gomez de la Maza, Not. Bot. Sist. 49 & 104. 1893; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 173, 229, 230, 357, 406, 428, 429, 636, 664, 778, 976, 1085, 1120, & 1121. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 710, 712, & 930, fig. 364a. 1973; Dory, Per-ring, & Rob, English Names Wild Fls. 28 & 101. 1974; Faris, Irish Nat. Journ. 18: 93. 1974; Fitter, Fitter, & Elamey, Wild Fls. Brit. & N. Eu. 260, 261, & 290, fig. 9. 1974; Malaisse in Lieth, Phen. & Season. Model. 281--283 & 439, fig. 7c. 1974; Moldenke, Phytologia 29: 83--113. 1974; A. L. Moldenke, Phytologia 29: 171. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 120, 382, 470, 480, 498, 509, 550, 625, 705, & 762. 1974.

ERIOCAULON AQUATICUM (J. Hill) Druce

Additional synonymy: Eriocaulon septangulare var. septangulare Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:]

762. 1974.

Additional bibliography: Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 429. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 32, 712, & 930, fig. 364a. 1973; Dony, Perring, & Rob, English Names Wild Fls. 28 & 101. 1974; Faris, Irish Nat. Journ. 18: 93. 1974; Fitter, Fitter, & Blamey, Wild Fls. Brit. & N. Eu. 260, 261, & 290, fig. 9. 1974; Moldenke, Phytologia 29: 89--90, 103, 111, & 216. 1974.

Additional illustrations: J. Hutchinson, Fam. Flow. Pl., ed. 3, 712, fig. 364a. 1973; Fitter, Fitter, & Blamey, Wild Fls. Brit. & N. Eu. 269, fig. 9 [in color]. 1974.

Additional citations: EIRE: Galway Co.: Sparrow s.n. [1 Sept. 1964] (Mi).

ERIOCAULON EIFISTULOSUM Van Heurck & Muell.-Arg.

Additional bibliography: Malaisse in Lieth, Phen. & Season. Model. 283 & 439. 1974; Moldenke, Phytologia 29: 93--94, 200, & 232. 1974.

ERIOCAULON BROWNIANUM Mart.

Additional bibliography: Moldenke, Phytologia 29: 86, 95--97, & 211. 1974.

Additional citations: SRI LANKA: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28293 (Tu).

ERIOCAULON BROWNIANUM var. LATIFOLIUM Moldenke

Additional bibliography: Moldenke, Phytologia 29: 96--97 & 211. 1974.

Additional citations: SRI LANKA: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28297 (Tu).

ERIOCAULON CINEREUM R. Br.

Additional bibliography: Moldenke, Phytologia 29: 85, 99--101, 196, 200, 209, 220, 221, 231, 232, & 236. 1974.

Additional citations: SRI LANKA: Cramer 3160 (W--2718343).

ERIOCAULON COLLINUM Hook. f.

Additional bibliography: Moldenke, Phytologia 29: 86, 101--102, 197, 202, 205, & 206. 1974.

Additional citations: SRI LANKA: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28287 (Tu), 28307 (Tu).

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Gomez de la Maza, Not. Bot. Sist. 49 & 104. 1893; Moldenke, Phytologia 29: 102--104, 107, 109, 111, 204, & 216. 1974.

Additional citations: NEW JERSEY: Atlantic Co.: Moldenke & Moldenke 28597 (Tu).

ERIOCAULON CRISTATUM Mart.

Additional bibliography: Moldenke, *Phytologia* 29: 92, 98, 105, & 205. 1974.

Additional citations: SRI LANKA: Moldenke & Moldenke 28325 (Ac).

ERIOCAULON DALZELLII var. GLABRATUM Moldenke, *Phytologia* 28: 192. 1974.

Bibliography: Moldenke, *Phytologia* 28: 192 & 444. 1974.

Citations: INDIA: Gujarat: Main s.n. [Aurangabad, 7-9-71; N. Y. Bot. Gard. type photo 8816] (Ac--type, N--photo of type, Z--isotype, Z--photo of type).

ERIOCAULON DECANGULARE L.

Additional bibliography: Moldenke, *Phytologia* 29: 103, 106--113, 204, & 216. 1974.

Additional citations: NEW JERSEY: Burlington Co.: Moldenke & Moldenke 29139 (Ac, Kh, Ld, Tu).

ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, *Phytologia* 29: 103, 107, 109--110, 204, & 216. 1974.

Additional citations: NICARAGUA: Zelaya: Nelson & Atwood 4468 (M1).

ERIOCAULON DIMORPHOPETALUM Moldenke

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 63 & 204, 1949; Moldenke, *Phytologia* 24: 357. 1972.

ERIOCAULON DIOECUM Ruhl.

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 43 & 204. 1949; Moldenke, *Phytologia* 24: 357. 1972.

ERIOCAULON ECHINOSPERMUM C. Wright

Synonymy: Eriocaulon echinospermum Sauvalle ex Gomez de la Maza, *Not. Bot. Sist.* 49. 1893.

Additional bibliography: Gomez de la Maza, *Not. Bot. Sist.* 49 & 104. 1893; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 43 & 204. 1949; Moldenke, *Phytologia* 24: 358. 1972.

ERIOCAULON FULIGINOSUM C. Wright

Additional synonymy: Eriocaulon sphaerospermum Sauvalle ex Gomez de la Maza, *Not. Bot. Sist.* 49. 1893. Eriocaulon trichosepalum Sauvalle ex Gomez de la Maza, *Not. Bot. Sist.* 49. 1893.

Additional bibliography: Gomez de la Maza, *Not. Bot. Sist.* 49 & 104. 1893; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 36, 43, 45, & 204. 1949; Moldenke, *Phytologia* 24: 460. 1972.

ERIOCAULON LINEARE Small

Additional bibliography: Moldenke, *Phytologia* 29: 203--204 &

216. 1974.

Additional citations: ALABAMA: Houston Co.: R. Kral 43404 (M1).

ERIOCAULON MALAISSEI Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 475. 1972; Malaisse in Lieth, Phen. & Season. Model. 281--283 & 439, fig. 7c. 1974.

ERIOCAULON MELANOCEPHALUM Kunth

Additional bibliography: Gomez de la Maza, *Not. Bot. Sist.* 49 & 104. 1893; Moldenke, *Phytologia* 29: 207. 1974.

ERIOCAULON MELANOCEPHALUM var. *LONGIPES* Griseb.

Additional bibliography: Gomez de la Maza, *Not. Bot. Sist.* 49 & 104. 1893; Moldenke, *Phytologia* 24: 476. 1972.

ERIOCAULON NILAGIRENSE Steud.

Additional bibliography: Moldenke, *Phytologia* 29: 211--212 & 238. 1974.

Additional citations: SRI LANKA: Cramer 3149 (W--2718353).

ERIOCAULON PELLUCIDUM Michx.

Additional bibliography: Airy Shaw in J. C. Willis, *Dict. Flow.* Pl., ed. 8, 429. 1973; Moldenke, *Phytologia* 29: 204 & 214--219. 1974.

Additional citations: QUÉBEC: Argenteuil Co.: Auclair & Walther s.n. [Sept. 22, 1962] (M1). ONTARIO: Thunder Bay Dist.: Hartley 1606 (M1). MAINE: Waldo Co.: Friesner 23054 (M1). VIRGINIA: Augusta Co.: Adams & Wherry 2394 (W--1653224); Killip 32582 (W--1739993); A. L. Nelson s.n. [Spring Pond, Aug. 9, 1935] (W--1683089).

ERIOCAULON PSEUDOCOMPRESSUM Ruhl.

Additional bibliography: Gomez de la Maza, *Not. Bot. Sist.* 49 & 104. 1893; Moldenke, *Phytologia* 24: 493. 1972.

ERIOCAULON SETACEUM L.

Additional bibliography: Malaisse in Lieth, Phen. & Season. Model. 283, 285, & 439. 1974; Moldenke, *Phytologia* 29: 197, 200, 221, 226--229, & 236. 1974.

ERIOCAULON SEXANGULARE L.

Additional bibliography: Moldenke, *Phytologia* 29: 200, 228--232, & 238. 1974.

Hu encountered this plant at the edge of pools of water, describing the heads as "white". Cramer 3105 is a mixture with E. truncatum Hamilt.

Additional citations: SRI LANKA: Cramer 3105, in part (W--2718369). HONGKONG: S. Y. Hu 12456 (W--2730666).

ERIOCAULON SIGMOIDEUM C. Wright

Synonymy: Eriocaulon sigmoideum Sauvalle ex Gomez de la Maza, Not. Bot. Sist. 49. 1893.

Additional bibliography: Gomez de la Maza, Not. Bot. Sist. 49 & 104. 1893; Moldenke, Phytologia 25: 76. 1972.

ERIOCAULON TRUNCATUM Hamilt.

Additional bibliography: Moldenke, Phytologia 29: 194, 208, 210, 227, & 234—236. 1974.

Cramer 3105 is a mixture with E. sexangulare L.

Additional citations: SRI LANKA: Cramer 2914 (W—2718306), 3105, in part (W—2718369).

ERIOCAULON ULAEI Ruhl.

Additional bibliography: Moldenke, Phytologia 25: 86 (1972), 28: 438 (1974), and 29: 236. 1974.

ERIOCAULON WILLDENOVIANUM Moldenke

Additional bibliography: Moldenke, Phytologia 29: 231 & 238. 1974.

Schmid-Hollinger refers to this species as "often abundant in wet places" in Sri Lanka.

Additional citations: SRI LANKA: Schmid-Hollinger 74 (W—2721316).

LACHNOCAULON Kunth

Additional bibliography: Wangerin in Just, Bot. Jahresber. 53 (2): 261. 1930; K. Jones, Taxon 9: 183. 1960; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1156 & Ind. 12. 1972; Rouleau, Taxon Index Vols. 1-20, part 1: 203. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 627. 1973; Anon., Biol. Abstr. 56 (3): B.A.S.I.C. S.28, S.89, S.144, S.147, & S.161 (1973), 56 (6): B.A.S.I.C. S.88, S.144, & S.147 (1973), and 56 (10): B.A.S.I.C. S.91, S.147, & S.149. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 712 & 939. 1973; R. Kral, Rhodora 75: 383—384. 1973; Moldenke, Biol. Abstr. 56: 1243, 1261, 3006, & 5374. 1973; Moldenke, Phytologia 26: 466—467, 469, & 506 (1973), 27: 509 (1974), 28: 428 & 509 (1974), and 29: 103 & 111. 1974; Hocking, Excerpt. Bot. A.23: 292. 1974; Moldenke, Biol. Abstr. 57: 678. 1974; A. L. Moldenke, Phytologia 29: 171—172 & 204. 1974.

LACHNOCAULON ANCEPS (Walt.) Morong

Additional bibliography: K. Jones, Taxon 9: 183. 1960; Rouleau, Taxon Index Vols. 1-20, part 1: 139. 1972; Moldenke, Phytologia 26: 466—467 (1973) and 29: 111. 1974; Hocking, Excerpt. Bot. A. 23: 292. 1974.

Additional citations: GEORGIA: Dodge Co.: R. Kral 28744 (W—2673943). ALABAMA: Baldwin Co.: Dress & Read 7513 (Ld). TEXAS: Hardin Co.: Cory 52778 (W—1925364). LOCALITY OF COLLECTION UNDETERMINED: Beyrich 58 [Carolina] (E—1613486).

LACHNOCAULON BEYRICHIANUM Sporleder

Additional bibliography: Moldenke, *Phytologia* 25: 91. 1972.

Kral encountered this species in bogs and at their margins in longleaf pine - turkey oak sandhills.

Additional citations: NORTH CAROLINA: Bladen Co.: R. Kral 27194 (W--2673950).

LACHNOCAULON DIGYNUM Körn.

Additional bibliography: R. Kral, *Rhodora* 75: 383. 1973; Moldenke, *Phytologia* 26: 184 (1973) and 28: 428. 1974.

Kral (1973) cites R. Kral 40960 from Conecuh County, 33835 from Escambia County, 35642 from Mobile County, and 35556 from Washington County, Alabama, collected in sandy longleaf pineland bogs, sphagnum swales and in sand-peat muck of bogs in longleaf pine sandhills, pine flatwoods bogs, and boggy bottoms, flowering and fruiting in July, September, and October. He comments that "This diminutive species, while already reported for Alabama by Moldenke.....is scarce enough in that state to be noteworthy. It ranges in the lower terraces of the coastal plain from Florida west to southern Mississippi, but is nowhere abundant." He describes the inflorescence-heads as "dull gray-brown".

Additional citations: ALABAMA: Escambia Co.: R. Kral 33835 (Mi, W--2673935).

LACHNOCAULON ENGLERI Ruhl.

Additional bibliography: Anon., *Biol. Abstr.* 56 (3): B.A.S.I.C. S.144. 1973; R. Kral, *Rhodora* 75: 383. 1973; Moldenke, *Biol. Abstr.* 56: 1243. 1973; Moldenke, *Phytologia* 26: 467. 1973.

Kral (1973) cites R. Kral 32646 from Baldwin County, Alabama, and notes that he found it in "peaty swale in slash pine - sand pine woods near estuary, Gulf Shores" in August. He says that "This species was until now known only for Florida, where it is locally abundant on sandy lakeshores, particularly in areas of karst topography." He describes the inflorescence-heads as "chocolate-brown" and found it in flower and fruit in August. Actually, I reported the Alabama extension of the range of this species on April 23, 1973, in *Phytologia* 26: 43.

Additional citations: ALABAMA: Baldwin Co.: Dress & Read 7496 (Ld); R. Kral 32646 (Mi, W--2673939).

LACHNOCAULON ENGLERI var. **CAULESCENS** Moldenke

Additional bibliography: Anon., *Biol. Abstr.* 56 (3): B.A.S.I.C. S.144. 1973; Moldenke, *Biol. Abstr.* 56: 1243. 1973; Moldenke, *Phytologia* 26: 43. 1973.

LACHNOCAULON FLORIDANUM Small

Additional bibliography: Moldenke, *Phytologia* 26: 43 (1973) and 29: 103. 1974.

The Buell & Godfrey 3550, distributed as L. floridanum, is actually Eriocaulon compressum Lam.

LACHNOCAULON GLABRUM Körn.

Additional bibliography: Moldenke, Phytologia 25: 92 (1972) and 29: 204. 1974.

The Pelton s.n. [July 14, 1961], distributed as L. glabrum, is actually Eriocaulon lineare Small.

LACHNOCAULON MINUS (Chapm.) Small

Additional bibliography: R. Kral, Rhodora 75: 384. 1973; Moldenke, Biol. Abstr. 56: 3006. 1973; Moldenke, Phytologia 26: 467 (1973) and 28: 428. 1974; Hocking, Excerpt. Bot. A.23: 292. 1974.

Kral (1973) cites R. Kral 39503 from Covington County and 43120 from Houston County, Alabama, found growing in sandy pond and lake shores, "tufted on moist sands in seepage around ponds, often very abundant" (Houston County, Alabama) or "infrequent on sandy peat of roadcuts through pine flatwoods bogs" (Lowndes County, Georgia). He comments that this is "A first report for Alabama for this species whose range has been thought to be in the lower coastal plain from Florida north to North Carolina."

Material has been misidentified and distributed in some herbaria as E. engleri Ruhl., a species which it often closely resembles but which may be distinguished by its chocolate-brown heads, while L. minus has dull-brown or light-brown ones.

Additional citations: GEORGIA: Lowndes Co.: R. Kral 28668 (W--2673949). FLORIDA: Volusia Co.: Curtiss 6894 (Ca--142526). ALABAMA: Covington Co.: R. Kral 39503 (W--2673940). Houston Co.: R. Kral 43120 (Mi, W--2673937).

LEIOTHRIX Ruhl.

Additional & emended bibliography: Wikstr., K. Svensk. Vet. Acad. Handl. Stockh., ser. 2, 1: 79, pl. 4. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. (repr.) [12]--[15], pl. 4. 1821; Fedde & Schust. in Just, Bot. Jahresber. 51 (1): 60 [42]. 1928; Wangerin in Just, Bot. Jahresber. 53 (2): 261. 1930; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 2: xxxiii (1970) and ed. 1, 6: 1156 & 1160--1161, map 1782, & Ind. 16. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 429, 649, & 1102. 1973; Anon., Biol. Abstr. 55 (9): B. A.S.I.C. S.144 (1973), 56 (3): B.A.S.I.C. S.89, S.144, S.147, & S. 161 (1973), 56 (6): B.A.S.I.C. S.30, S.88, S.144, S.147, S.161, & S.190 (1973), and 56 (10): B.A.S.I.C. S.91, S.147, & S.149. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 710 & 940. 1973; Moldenke, Biol. Abstr. 56: 1243, 1261, 3006, & 5374. 1973; Moldenke, Phytologia 26: 184--186, 197, 227, 467, 470, 471, 479, & 506 (1973), 27: 509 (1974), 28: 439, 459, & 509 (1974), and 29: 209. 1974; Hocking, Excerpt. Bot. A.23: 291 & 292. 1974; Moldenke, Biol. Abstr. 58: 680. 1974.

Airy Shaw (1973) still gives Stephanophyllum Guill. as a synonym of Paepalanthus Mart., while actually, as I have pointed out several times over the past years, it is a synonym of Leiothrix.

LEIOTHRIX AFFINIS Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 25: 94—95. 1972; Moldenke, *Biol. Abstr.* 56: 3006. 1973; Hocking, *Excerpt. Bot. A.* 23: 292. 1974.

LEIOTHRIX ARGYRODERMA var. *BREVIPEDES* Moldenke

Additional bibliography: Moldenke, *Phytologia* 25: 96 (1972) and 28: 439. 1974.

The Eitens found this plant growing in an open marshy thin humus layer of soil over a sloping rock-face at 2500 meters altitude, flowering and fruiting in November.

Additional citations: BRAZIL: Rio de Janeiro: Eiten & Eiten 6608 (W—2688327).

LEIOTHRIX CURVIFOLIA (Bong.) Ruhl.

Additional synonymy: Trichocephalus curvifolius Mart., in herb.

Additional bibliography: Moldenke, *Phytologia* 25: 97—99. 1972.

Martius 893 is a mixture of L. curvifolia, L. curvifolia var. lanuginosa (Bong.) Ruhl., and Paepalanthus pubescens Körn.

LEIOTHRIX CURVIFOLIA var. *LANUGINOSA* (Bong.) Ruhl.

Additional bibliography: Moldenke, *Phytologia* 26: 44. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, ser. 6, 2: 236—237, pl. 19 (inf.). 1832 (N, Z).

LEIOTHRIX CURVIFOLIA var. *MICROPHYLIA* Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 25: 129. 1973.

The Eitens found this plant growing in fields with outcropping slabs of itacolomite quartzite, at 1150 meters altitude, flowering and fruiting in November.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36203 (N); Eiten & Eiten 6851 (W—2688353).

LEIOTHRIX CURVIFOLIA var. *PLANTAGO* (Mart.) Ruhl.

Additional bibliography: Moldenke, *Phytologia* 26: 44. 1973.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27354 (S); Hatschbach, Smith, & Ayensu 28797 (S).

LEIOTHRIX CURVIFOLIA var. *SETACEA* Ruhl.

Additional bibliography: Moldenke, *Phytologia* 26: 44. 1973.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27430 (S).

LEIOTHRIX CUSCUTOIDES Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 44. 1973.

The Eitens found this plant growing on low rounded rocky outcrops in open fields, flowering in November, and describe the flowers as white.

Additional citations: BRAZIL: Minas Gerais: Eiten & Eiten 6709 (W—2688328); Hatschbach, Smith, & Ayensu 28822 (S, W—2706507).

LEIOTHRIX DIELSII Ruhl.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1161 & Ind. 16. 1972; Moldenke, Phytologia 25: 99. 1972.

LEIOTHRIX DISTICHOCLADA Herzog

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Moldenke, Phytologia 25: 99. 1972; Moldenke, Biol. Abstr. 56: 3006. 1973; Hocking, Excerpt. Bot. A. 23: 292. 1974.

LEIOTHRIX DISTICHOCLADA var. GLANDULOSA Herzog

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Moldenke, Phytologia 25: 99. 1972; Moldenke, Biol. Abstr. 56: 3006. 1973; Hocking, Excerpt. Bot. A. 23: 292. 1974.

LEIOTHRIX EDWALLII Alv. Silv.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1161 & Ind. 16. 1972; Moldenke, Phytologia 25: 130. 1973.

LEIOTHRIX FLAVESCENS (Bong.) Ruhl.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1161, map 1782, & Ind. 12 & 16. 1972; Anon., Biol. Abstr. 55 (9): B.A.S.I.C. S. 1144. 1973; Moldenke, Phytologia 26: 185, 227, & 479 (1973) and 29: 209. 1974; Hocking, Excerpt. Bot. A. 23: 292. 1974.

The Rambo 56190 [Herb. Barb. Rodr. 12287], distributed as L. flavescens, is actually Eriocaulon modestum Kunth.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27346 (S). Paraná: Reitz & Klein 17908 (S).

LEIOTHRIX FLAVESCENS var. PARVIFOLIA Moldenke

Additional bibliography: Moldenke, Phytologia 25: 131 & 229. 1973; Anon., Biol. Abstr. 55 (9): B.A.S.I.C. S. 1144. 1973; Hocking, Excerpt. Bot. A. 23: 292. 1974.

Reitz & Klein encountered this plant on a wet campo at 900 meters altitude.

Additional citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 28946 (N--isotype). Santa Catarina: Reitz & Klein 10290 (Ld).

LEIOTHRIX FLUITANS (Mart.) Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 45. 1973.

Citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 53 I. 1863 (N, Z).

LEIOTHRIX FLUMINENSIS Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 45 (1973) and

28: 439 & 459. 1974.

LEIOTHRIX FLUMINENSIS var. *PUBERULA* Moldenke

Synonymy: *Leiothrix fluminensis* var. *pilosa* Moldenke, *Phytologia* 28: 459, in syn. 1974.

Additional bibliography: Moldenke, *Phytologia* 25: 132 (1973) and 28: 439 & 459. 1974.

The label accompanying the Guillemín collection, cited below, is plainly inscribed as no. "139", while on the type specimen it has been altered to "239" for some reason unknown to me. It is very probable that the specimen cited below as "139" is part of the same type collection of this variety. Guillemín collected in the state of Rio de Janeiro at least from October 19, 1838, to January 15, 1839, and from February 18, 1839, to May 26, 1839, and in São Paulo only from January 19, 1839, to February 18, 1839. The typical form of the species is known only from Rio de Janeiro, so it seems safe to assume that the type of the variety is also from that state.

Additional citations: BRAZIL: Rio de Janeiro: Guillemín 139 (E-1642249).

LEIOTHRIX HATSCHBACHII Moldenke, *Phytologia* 25: 229, nom. nud. 1973.

Bibliography: Moldenke, *Phytologia* 25: 229. 1973; Moldenke, *Biol. Abstr.* 58: 680. 1974.

Citations: BRAZIL: Minas Gerais: Hatschbach 30165 (Z-type).

LEIOTHRIX HIRSUTA (Wikstr.) Ruhl.

Additional & emended bibliography: Wikstr., *K. Vet. Acad. Handl. Stockh.*, ser. 2, 1: 79-81, pl. 4. 1820; Wikstr., *Trenne Nya Art. Örtsl. Erioc.* (repr.) 12-[15], pl. 4. 1821; Anon., *Biol. Abstr.* 56 (3): B.A.S.I.C. S.147. 1973; Moldenke, *Biol. Anstr.* 56: 1243. 1973; Moldenke, *Phytologia* 25: 132-133 (1973) and 26: 470 & 471. 1973; Hocking, *Excerpt. Bot. A.23*: 291. 1974.

Additional illustrations: Wikstr., *K. Vet. Acad. Handl. Stockh.*, ser. 2, 1: pl. 4. 1820; Wikstr., *Trenne Nya Art. Örtsl. Erioc.* (repr.) pl. 4. 1821.

Belém & Pinheiro, on the labels accompanying their specimens, describe the plants as 15-35 cm. tall, but it seems obvious that it is the length of the leaves to which they are here referring, because the flowering peduncles on the specimens described as 15 cm. tall are actually 47 cm. tall! They describe the inflorescences as "white" and found the plants in flower in June.

Additional citations: BRAZIL: Bahia: Belém & Pinheiro 2432 (N), 2439 (N).

LEIOTHRIX HIRSUTA f. *VIVIPARA* Moldenke

Additional bibliography: Anon., *Biol. Abstr.* 56 (3): B.A.S.I.C. S.147. 1973; Moldenke, *Biol. Abstr.* 56: 1243. 1973; Moldenke, *Phytologia* 25: 133. 1973; Hocking, *Excerpt. Bot. A.23*: 291. 1974.

LEIOTHRIX LUXURIANS (Körn.) Ruhl.

Additional bibliography: Moldenke, *Phytologia* 26: 185. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35480 (N); Hatschbach 30065 (N). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 54. 1863 (N, Z).

LEIOTHRIX MUCROMATA (Bong.) Ruhl.

Additional bibliography: Moldenke, *Phytologia* 25: 134. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, ser. 6, 2: 234--235, pl. 19 (sup.). 1832 (N, Z).

LEIOTHRIX NUBIGENA (Kunth) Ruhl

Additional bibliography: Moldenke, *Phytologia* 25: 134 (1973) and 26: 197. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 55 II. 1863 (N, Z).

LEIOTHRIX PEDUNCULOSA Ruhl.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1161 & Ind. 16. 1972; Moldenke, *Phytologia* 26: 185. 1973.

Angely (1970) misspells Ruhland's surname "Rugland", doubtless a typographic error.

LEIOTHRIX PILULIFERA (Körn.) Ruhl.

Additional bibliography: Moldenke, *Phytologia* 25: 135. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 55 I. 1863 (N, Z).

LEIOTHRIX SCLEROPHYLLA Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 467. 1973.

Additional citations: BRAZIL: Minas Gerais: Hatschbach & Ahumada 31589 (N).

LEIOTHRIX TINGUENSIS Herzog

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [52]. 1928; Moldenke, *Phytologia* 25: 137. 1973.

LEIOTHRIX VIVIPARA var. ANGUSTA Ruhl.

Additional bibliography: Moldenke, *Phytologia* 25: 138. 1973.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27489 (S, W--2706784).

MESANTHEMUM Körn.

Additional synonymy: Mesanthum Metcalfe, *Taxon* 1: 130. 1951.

Additional & amended bibliography: Anon., *Journ. Linn. Soc. Lond. Bot.* 20: 522. 1884; Durand & Schinz, *Consp. Fl. Afr.* 5: 504. 1894; Engl., *Pflanzenw. Ost-Afr. C*: 133. 1895; N. E. Br. in *Thiselt.-Dyer, Fl. Trop. Afr.* 8: 231 & 260--262. 1901; Malmarche, *Contrib. Étud. Anatom. Eriocaul.* [thesis] 159. 1919; Kräusel in Just, Bot. Jahres-

ber. 48 (1): 244. 1926; Pellegr., Mém. Soc. Linn. Normand. 26 [ser. 2, 1 (4)]: 58. 1938; Pellegr., Fl. Mayombe 3: 58. 1938; Metcalfe, Taxon 1: 130. 1951; Rouleau, Taxon Index Vols. 1-20 part 1: 231. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 440, 735, & 737. 1973; Anon., Biol. Abstr. 56 (3): B.A.S.I.C. S.144, S.147, & S.161 (1973), 56 (6): B.A.S.I.C. S.147, S.161, & S.190 (1973), and 56 (10: B.A.S.I.C. S.147 & S.149. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 710 & 944. 1973; Moldenke, Biol. Abstr. 56: 1261, 3007, & 5374. 1973; Moldenke, Phytologia 26: 467-468 & 507 (1973) and 28: 441, 460, & 510. 1974; Moldenke, Biol. Abstr. 57: 678. 1974.

MESANTHEMUM PRESCOTTIANUM (Bong.) Körn.

Additional & emended bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 504. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 260-262. 1901; Moldenke, Phytologia 26: 467-468. 1973.

Brown (1901) cites only the type collection — "Sierra Leone, without indication of the collector!" and comments that "Bongard states that this plant is a native of Rio de Janeiro, but upon what authority does not appear. He described it from a specimen in the herbarium of Prescott, which was received from Lindley. The Kew example (also received from Lindley), is labelled 'Sierra Leone', which is much more likely to be the right habitat than Brazil, since the other species of *Mesanthemum* are all from Tropical Africa and Madagascar. However, as the plant appears not to have been collected again, the locality requires confirmation."

Additional citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 60 I. 1863 (N, Z).

MESANTHEMUM PUBESCENS (Lam.) Körn.

Additional bibliography: Anon., Journ. Linn. Soc. Lond. Bot. 20: 522. 1884; Durand & Schinz, Consp. Fl. Afr. 5: 504. 1894; Perrier de la Bâthie, Cat. Pl. Madag. 22. 1934; Moldenke, Phytologia 25: 140 & 141. 1973.

MESANTHEMUM RADICANS (Benth.) Körn.

Additional & emended bibliography: Durand & Schinz, Consp. Fl. Afr. 5: 504. 1894; Engl., Pflanzenw. Ost-Afr. C: 133. 1895; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 260-261. 1901; Pellegr., Mém. Soc. Linn. Normand. 26 [ser. 2, 1 (4)]: 58. 1938; Pellegr., Fl. Mayombe 3: 58. 1938; Moldenke, Phytologia 26: 468 (1973) and 28: 441. 1974.

Pellegrini (1938) found this plant on a "Plaine sablonneuse, à 50 m. de la mer", flowering in January, and cites "L. T. 966".

Brown (1901) cites Perrottet 8-8 from Sénégal, Afzelius s.n., Don s.n., Hart s.n., Scott-Elliott 3994, and Smethman s.n. from Sierra Leone, Ansell s.n. from Liberia, Barter 20211 & 20219, Kalbreyer 245, Milson s.n., and Robb s.n. from Nigeria, Milne s.n. from Fernando Po, Jardin s.n. from Gabun, Soyaux s.n. from French Congo, Büttner s.n. and Smith s.n. from Zaire, and Curror

s.n. from Angola. He comments that "The female flowers of this plant are somewhat variable; in some specimens the sepals are only about 1/3 as long as the corolla, in others about half as long, whilst in Kalbreyer 245 they are 3/4 as long; in most examples they are simply denticulate at the apex, but in others they are distinctly ciliate, these two extremes, however, are connected by forms in which the ciliation is represented by one or two hairs only. But I do not consider these differences of specific or even varietal importance in the case of this plant, for in all other characters the plant is fairly uniform. This species was unfortunately included in the *Flora Capensis* before I had discovered that all Curror's plants (which are labelled 'South of the Tropic') were collected in Angola."

Durand & Schinz (1894) record this species from "Niger" [Niger Republic?]. Mrs. Richards found it growing in very wet grass and swamp land.

Additional citations: ZAMBIA: Mrs. M. Richards s.n. [19.1. 1960] (E—1767815).

MESANTHEMUM RUTENBERGIANUM Körn.

Additional bibliography: Anon., Journ. Linn. Soc. Lond. Bot. 20: 522. 1884; Durand & Schinz, Consp. Fl. Afr. 5: 504. 1894; Perrier de la Bâthie, Cat. Pl. Madag. 22. 1934; Moldenke, Phytologia 26: 46. 1973.

PAEPALANTHUS Mart.

Additional & emended bibliography: Wikstr., K. Svensk. Vet. Akad. Handl. Stockh., ser. 2, 1: 76, pl. 3. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. (repr.) 9—11, 14, & [15], pl. 3. 1821; Mart., Erioc. Selbst. Pflanzenfam. 12—15, 23, 27, 42, 57, & 60, pl. 1 [I], fig. 1—6, & pl. 2 [I], fig. 1—7. 1833; Gomez de la Maza, Not. Bot. Sist. 49 & 110. 1893; Durand & Schinz, Consp. Fl. Afr. 5: 504. 1894; N. E. Br. in Thiselet.—Dyer, Fl. Trop. Afr. 8: 231 & 262—264. 1901; Malmanche, Contrib. Étud. Anatom. Eriocaul. [thesis]. 1919; Kräusel in Just, Bot. Jahresber. 48 (1): 244. 1926; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60—61 [42—43]. 1928; Wangerin in Just, Bot. Jahresber. 53 (2): 261. 1930; León, Fl. Cuba 1: 279 & 281. 1946; Metcalfe, Taxon 1: 130. 1951; Moldenke in R. E. Schult., Bot. Mus. Leaflet. Harvard Univ. 17: 66. 1955; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; Braga, Pl. Nordest., ed. 2, 20. 1960; Angely, Fl. Anal. & Fito-geogr. Est. S. Paulo, ed. 1, 2: xxxiii (1970) and ed. 1, 6: 1156—1164, maps 1777—1781, & Ind. 20—21. 1972; Rouleau, Taxon Index Vols. 1—20 part 1: 271. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 258, 394, 429, 673, 842, & 1102. 1973; Anon., Biol. Abstr. 56 (3): B.A.S.I.C. S.147 & S.161 (1973), 56 (6): B.A.S.I.C. S.88, S.147, S.161, S.190, S.256, & S.279 (1973), 56 (9): B.A.S.I.C. S.93 & S.199 (1973), and 56 (10): B.A.S.I.C. S.149. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 710, [711], & 949, fig. 364. 1973; Moldenke, Biol. Abstr. 56: 1261, 3000, 3007, 4784, 5374, & 7484. 1973; Thorne in Meggers, Ayensu, & Duckworth, Trop.

For. Ecosyst. Afr. & S. Am. 29, 33, & 36. 1973; Moldenke, Phytologia 26: 455, 460, 468—484, 503, 504, & 508 (1973), 27: 67—69, fig. 2 (1973), 27: 510 (1974), 28: 193—194, 432, 435, 436, 439, 440, 456, 460, 461, 466, 467, & 510 (1974), and 29: 76—78, 192, 208, 209, & 211. 1974; Anon., Biol. Abstr. 57 (2): B.A.S.I.C. E. 94. 1974; Hocking, Excerpt. Bot. A.23: 290—292. 1974; Moldenke, Biol. Abstr. 57: 678 & 679. 1974.

Thorne (1973) asserts that there are 485 species in this genus, of which 484 are American, 2 are African, and 1 is from Madagascar.

It is interesting to note that Airy Shaw (1973) still maintains the genus Stephanophyllum Guill. as a synonym of Paepalanthus, when actually, as I have previously pointed out several times over the past years, it is congeneric with Leiothrix Ruhl. and antedates that name.

The Murça Pires 422, distributed as Paepalanthus sp., is actually Syngonanthus paraënsis Ruhl., Murça Pires 737 is S. simplex (Miq.) Ruhl., and R. Espinosa E.988 is not eriocaulaceous.

PAEPALANTHUS ACANTHOPHYLLUS Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 468. 1973.

Lützelburg reports that this species constitutes about 10 percent of the vegetation at 1600—1700 meters altitude on the Serra Itubira, in Bahia, where he found it in flower and fruit in August.

Material has been misidentified and distributed in some herbaria as P. amoenus (Bong.) Körn. On the other hand, the Irwin, Grear, Souza, & Reis dos Santos 14300 and Murça Pires, Grear, Souza, & Reis dos Santos 14300, distributed as P. acanthophyllum, are actually P. cordatus Ruhl., Irwin, Souza, Grear, & Reis dos Santos 17860 is P. speciosus (Bong.) Körn., and Glaziou 19977, Hatschbach 29948, Mello Barreto 2487 [Herb. Jard. Bot. Belo Horiz. 8236 & 8237], and L. B. Smith 7075 are P. urbanianus Ruhl.

Additional citations: BRAZIL: Bahia: Lützelburg 216a (Mu), 216b (Mu). Goiás: Irwin, Harley, & Smith 32704 (N); Irwin, Reis dos Santos, Souza, & Fonseca 24649 (N). Minas Gerais: Anderson, Stieber, & Kirkbride 35857 (N, W--2709829).

PAEPALANTHUS ACUTIPILUS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 187 & 192. 1973.

Additional citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 30224 (N); Koczicki 303 (Ld).

PAEPALANTHUS AEQUALIS (Vell.) J. F. Macbr.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157 & Ind. 20. 1972; Moldenke, Phytologia 26: 47, 471, & 484. 1973.

In addition to the months previously reported by me, this species has been collected in anthesis and fruit in January.

Additional citations: BRAZIL: Minas Gerais: Widgren s.n. [1845] (Mu). São Paulo: Brade 6584 (Mu). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 48 III. 1863 (N, Z).

PAEPALANTHUS ALBO-TOMENTOSUS Herzog

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; Moldenke, Phytologia 25: 146. 1973.

Additional citations: BRAZIL: Bahia: Lützelburg 279 [Macbride photos 18692] (Mu—cotype), 438 (Mu—cotype, Z—cotype).

PAEPALANTHUS ALBO-VAGINATUS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 187. 1973.

Recent collectors describe this plant as an "erva, flôr branca" or "flôr cinzeta" and have encountered it in sandy somewhat wet soil on campos or on "campo limpo", at altitudes of 750 to 1400 meters, flowering in September, October, December, and January, and fruiting in October.

Additional citations: BRAZIL: Paraná: Hatschbach 24712 (S), 32963 (N). Santa Catarina: Klein 3802 (Ld); Reitz & Klein 4781 (Ld), 5300 (Rd), 6063 (Ac).

PAEPALANTHUS ALPINUS Körn.

Additional bibliography: Moldenke, Phytologia 26: 468 & 480. 1973.

Barclay and his associates refer to this plant as a caespitose perennial from a thick taproot, the leaves in a rosette, and the flowers white. They found it to be common in marshy areas of the páramo zone. Schultes and his associates encountered it on wet roadside banks, flowering and fruiting in June, the flowers again described as white.

Additional citations: COLOMBIA: Cundinamarca: Barclay, Juajibioy, & Gama 3223 (W—2702256); Humbert, Idrobo, Jaramillo, Perez Arbelaez, & Uribe Uribe 26896 (P); Schultes, Martin, & Plowman 13 (W—2711065).

PAEPALANTHUS ALSINOIDES C. Wright

Additional synonymy: Paepalanthus alsinoides Sauvalle ex Gomez de la Maza, Not. Bot. Sist. 49. 1893.

Additional bibliography: Gomez de la Maza, Not. Bot. Sist. 49 & 110. 1893; León, Fl. Cuba 1: 283. 1946; Moldenke, Phytologia 25: 146. 1973.

PAEPALANTHUS ALSINOIDES var. MINIMUS Jennings

Additional bibliography: León, Fl. Cuba 1: 283. 1946; Moldenke, Phytologia 25: 146. 1973.

Additional citations: ISLA DE PINOS: Killip 42879 (S), 45147 (Mu), 45388 (Mu).

PAEPALANTHUS AMOENUS (Bong.) Körn.

Additional synonymy: Paepalanthus fenizianus Mart., in herb.

[not P. fenzlianus Körn., 1959].

Additional bibliography: Moldenke, *Phytologia* 26: 187 & 481 (1973) and 28: 439. 1974.

The P. fenzlianus accredited to Körnicke, referred to in the synonymy above, is a synonym of the very similar P. speciosus (Bong.) Körn.

The Irwin, Reis dos Santos, Souza, & Fonséca 24649, distributed as P. amoenus, is actually P. acanthophyllus Ruhl.; Irwin, Grear, Souza, & Reis dos Santos 13588 & 14300 are P. cordatus Ruhl.; Irwin, Souza, Grear, & Reis dos Santos 17860 is P. speciosus (Bong.) Körn.; Héringer 7887/81, Irwin, Souza, & Reis dos Santos 11580 & 11670, Maguire, Maguire, & Murça Pires 44790, and Philcox & Onishi 4892 are P. speciosus var. attenuatus Moldenke; Claussen s.n., Irwin, Grear, Souza, & Reis dos Santos 12358, 13925, & 15375, and Irwin, Maxwell, & Wasshausen 20239 are P. speciosus var. glaber Ruhl.; and Glaziou 19977, Héringer 10431, and Irwin, Harley, & Smith 32034 are P. urbanianus Ruhl.

Additional citations: BRAZIL: Minas Gerais: Martius 878 [N. Y. Bot. Gard. type photo neg. N.S. 8852] (Mu, Mu, N--photo, Z--photo). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 42 (N, Z).

PAEPALANTHUS ANDICOLA Körn.

Additional bibliography: Moldenke, *Phytologia* 25: 147 (1973) and 26: 480. 1973.

PAEPALANTHUS APPLANATUS Ruhl.

Additional bibliography: Moldenke, *Phytologia* 25: 148. 1973.

Material of this species has been misidentified and distributed in some herbaria as P. speciosus (Bong.) Körn.

Additional citations: BRAZIL: Minas Gerais: Glaziou 19973 [Macbride photos 10570] (C--isotype).

PAEPALANTHUS ARGENTEUS (Bong.) Körn.

Additional bibliography: Moldenke, *Phytologia* 26: 47 & 254. 1973.

Anderson describes this plant as having a "short trunk" and found it growing on a rocky slope at an altitude of 1250 meters in an area of "gallery forest along stream and slopes above, one side being rocky (quartzite) with sandy soil, the other side having an area of grass cerrado on red clay."

Additional citations: BRAZIL: Minas Gerais: W. R. Anderson 8566 (Ld); Hatschbach 27403 (S).

PAEPALANTHUS ARGILLICOLA Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 468. 1973; Hocking, *Excerpt. Bot. A.* 23: 291. 1974.

PAEPALANTHUS ARGILLICOLA var. **PILOSUS** Moldenke

Additional bibliography: Moldenke, *Phytologia* 25: 149 & 229. 1973; Moldenke, *Biol. Abstr.* 55: 4242. 1973; Hocking, *Excerpt. Bot.* A.23: 291. 1974.

PAEPALANTHUS ARMERIA Mart.

Additional bibliography: Moldenke, *Phytologia* 26: 468—469. 1973.

Additional citations: BRAZIL: Goiás: J. E. Pohl s.n. [Chapada de S. Marcos; Macbride photos 18693] (Mu—type, Z—isotype).

PAEPALANTHUS ASPER Alv. Silv.

Additional bibliography: Moldenke, *Biol. Abstr.* 56: 4784 & 7484. 1973; Moldenke, *Phytologia* 26: 136. 1973.

PAEPALANTHUS ATER Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 136 & 235. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35763 (N).

PAEPALANTHUS AUYANTEPUIENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 25: 150. 1973.

Additional citations: VENEZUELA: Bolívar: J. A. Steyermark 93957 (Mu).

PAEPALANTHUS BAHIENSIS (Bong.) Kunth

Additional bibliography: Moldenke, *Phytologia* 25: 151 (1973) and 26: 202, 228, 234, & 242. 1973.

PAEPALANTHUS BARBIGER Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 136 & 235. 1973.

The Eitens found this plant growing in fine light-gray sand with some humus and also on hillsides with small stones and gravel, flowering and fruiting in November.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35299 (N, W—2709803), 35420 (N, W—2709802); Eiten & Eiten 6793 (W—2688329), 6894 (N, W—2687695).

PAEPALANTHUS BARBULATUS Herzog

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 53 (1): 60 [42]. 1928; Moldenke, *Phytologia* 25: 151—152 (1973) and 26: 241 & 242. 1973.

Additional citations: BRAZIL: Bahia: Lützelburg 212 [Macbride photos 18694] (Mu—cotype, Z—cotype), 212aI (Mu—cotype), 212aII (Mu—cotype).

PAEPALANTHUS BATOCEPHALUS Ruhl.

Additional bibliography: Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1157 & Ind. 20. 1972; Moldenke, *Phytologia* 25:

152. 1973.

PAEPALANTHUS BELIZENSIS Moldenke, *Phytologia* 27: 67—68, fig. 2. 1973.

Bibliography: Moldenke, *Phytologia* 27: 67—68, fig. 2 (1973) and 28: 432. 1974.

Illustrations: Moldenke, *Phytologia* 27: 68, fig. 2. 1973.

Citations: BRITISH HONDURAS: McKee 11373 (N—photo of type, W—264489—type, Z—photo of type).

PAEPALANTHUS BIFIDUS (Schrad.) Kunth

Additional synonymy: *Eriocaulon fasciculatum* L., in herb.

Additional bibliography: Moldenke, *Phytologia* 26: 469 (1973) and 29: 76. 1974.

The *Eriocaulon pygmaeum* Mart., *E. (Paepalanthus) pygmaeum* Mart., and *Paepalanthus fasciculatus* f. *pygmaea* Körn., previously included in the synonymy of *P. bifidus*, should now be shifted to the synonymy of *P. bifidus* f. *frustus* Moldenke.

The G. Gardner 1170 collection, cited below, is a mixture with *P. lamarckii* Kunth. The Blanchet 470 & 2599, Essed s.n. [Sept. 1914], Lützelburg 7239, Maguire & Fanshawe 32204, Martius 555, Mexia 5816, Murça Pires, Black, Wurdack, & Silva 6161, Pickel 734, L. Riedel s.n. [Bahia, 1859], Schwacke 8494 [Herb. Jard. Bot. Belo Horiz. 26668], and J. A. Steyermark 89671, distributed and previously cited by me as typical *P. bifidus*, are actually all f. *brevipes* Moldenke, while Martius 558 is the type collection of f. *frustus* Moldenke.

Prance and his associates found *P. bifidus* growing on white sand in disturbed caatinga.

Additional citations: BRAZIL: Amazonas: Prance, Coêlho, Maas, & Pinheiro 11658 (Mu, Mu, N, S); Prance, Ramos, Farias, & Philcox 4835 (S). Pará: Spruce 108 (Mu). Rio Grande do Norte: Tavares 422 (W—2692382). State undetermined: G. Gardner 1170, in part (N).

PAEPALANTHUS BIFIDUS f. *BREVIPES* Moldenke, *Phytologia* 29: 76. 1974.

Bibliography: Moldenke, *Phytologia* 29: 76. 1974.

This form differs from the typical form of the species in having its peduncles during full anthesis and/or fruit only 1—3 cm. in length.

Collectors have found this plant growing in dry sandy places, in sandy soil among rocks, in dry sandy or gravelly places in general, and in dry soil, at altitudes of 300—1250 meters, flowering in May and both flowering and fruiting in April, September, October, and December. They describe it as an herb with "brownish-white" flowers. Maguire & Fanshawe refer to it as a "locally common weedy annual about rest house" in Guyana; Mexia also refers to it as "common locally".

Some specimens on the Munich sheet of Lützelburg 7239 approach

f. frustus in appearance, but probably are merely immature.

Material of f. brevipes has been misidentified and distributed in herbaria under the names Eriocaulon congestum H.B.K., E. fasciculatum Lam., E. villosum Salzm., Paepalanthus bifidus Kunth, and P. bifidus (Schrad.) Kunth.

Citations: VENEZUELA: Bolívar: J. A. Steyermark 89671 (Mi, N). GUYANA: Maguire & Fanshawe 32204 (Mu, N). SURINAM: Essed s.n. [Sept. 1914] (N, Ut--44076a). BRAZIL: Bahia: Blanchet 470 (N), 2599 (M); L. Riedel s.n. [Bahia, 1859] (N), s.n. (Br); Sellow 565 (Br, Br, N--photo, Z--photo). Espírito Santo: Lützelburg 7239 (Mu). Minas Gerais: Martius 555 (N); Mexia 5816 [Herb. Leonard 8345] (B--isotype, Gg--236100--isotype, Go--isotype, Mi--isotype, N--type, Qu--isotype, S--isotype, Ut--50247a--isotype, W--1571893--isotype); Schwacke 8494 [Herb. Jard. Bot. Belo Horiz. 26668] (N). Pará: Murça Pires, Black, Wurdack, & Silva 6161 (N). Pernambuco: Pickel 734 (N).

PAEPALANTHUS BIFIDUS f. FRUSTUS Moldenke, Phytologia 29: 76. 1974.

Synonymy: Eriocaulon pygmaeum Mart., Flora 24, Beibl. 2: 60. 1841 [not E. pygmaeum Dalz., 1851, nor Körn., 1863, nor Soland., 1809]. Eriocaulon (Paepalanthus) pygmaeum Mart. ex Moldenke, Phytologia 20: 444, in syn. 1970. Paepalanthus fasciculatus f. pygmaea Körn. ex Moldenke, Phytologia 20: 445, in syn. 1970. Eriocaulon (Paepalanthus) pygmaeus Mart. ex Moldenke, Phytologia 25: 240, in syn. 1973.

Bibliography: Mart., Flora 24, Beibl. 2: 60. 1841; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 153 & 287. 1903; Moldenke, Résumé 291. 1959; Moldenke, Phytologia 20: 444 & 445. 1970; Moldenke, Fifth Summ. 2: 509 & 582. 1971; Moldenke, Phytologia 25: 240 (1973) and 29: 76. 1974.

The type of this interesting form was collected by Bernhard Luschnath (no. 32) "in campis maritimis prope Caballo", Bahia, Brazil, and is deposited in the Munich herbarium. The plant was apparently in flowering and fruiting stage in August. The form is known only from this original collection of thirteen plants and the recent gathering by Irwin and his associates in Goiás, who describe it as a cushion herb with white flowers and found it in pastures at 300 meters altitude, flowering in April. Some plants on Lützelburg 7239, from Espírito Santo, approach it in habit and appearance, but are probably only immature specimens of f. brevipes.

Citations: BRAZIL: Bahia: Luschnath 32 [Martius 558] (Br--isotype, Br--isotype, M--isotype, Mu--type, N--photo of isotype, Z--photo of isotype). Goiás: Irwin, Greear, Souza, & Reis dos Santos 14480 (N).

PAEPALANTHUS BIFRONS Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 137. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36250 (N).

PAEPALANTHUS BLEPHAROPHORUS (Bong.) Kunth

Additional bibliography: Moldenke, *Phytologia* 25: 153 (1973) and 26: 484. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, ser. 6, 2: 229--231, pl. 16. 1832 (N, Z).

PAEPALANTHUS BOMBACINUS Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 137 & 235. 1973.

Anderson refers to this species as an herb and encountered it "in wet sand in area of gallery forest along stream and slopes above, one side being rocky (quartzite) with sandy soil, and the other side having an area of grassy cerrado on red clay", at 1250 meters altitude.

Additional citations: BRAZIL: Minas Gerais: W. R. Anderson 8587 (ld); Anderson, Stieber, & Kirkbride 36232 (N); Williams & Assis 2926 (E--1309480).

PAEPALANTHUS BONJARDI Kunth

Additional bibliography: Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1158 & Ind. 20. 1972; Moldenke, *Phytologia* 25: 153 (1973) and 26: 442. 1973.

Additional citations: MOUNTED ILLUSTRATIONS: Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, ser. 6, 1: pl. 7. 1831 (N, Z).

PAEPALANTHUS BRACHYPUS (Bong.) Kunth

Additional bibliography: Moldenke, *Phytologia* 26: 469. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35418a (N). MOUNTED ILLUSTRATIONS: Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, ser. 6, 1: pl. 6. 1831 (N, Z).

PAEPALANTHUS BRASILIENSIS (Mart.) Mart.

Additional bibliography: Moldenke, *Phytologia* 25: 154--155 (1973) and 26: 202. 1973.

Additional citations: BRAZIL: Minas Gerais: Martius s.n. [prope Arraial d'Agua Suja, Junio 1813; Macbride photos 18695] (Mu--type, Z--isotype). MOUNTED ILLUSTRATIONS: Körn. in Mart., *Fl. Bras.* 3 (1): pl. 44 I. 1863 (N, Z).

PAEPALANTHUS BRITTONI Moldenke

Additional bibliography: León, *Fl. Cuba* 1: 282 & 283, fig. 113. 1946; Moldenke, *Phytologia* 25: 156--157. 1973.

Illustrations: León, *Fl. Cuba* 1: 282, fig. 113. 1946.

PAEPALANTHUS BROMELIOIDES Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 137--138, 143,

& 240. 1973.

The Irwin, Harley, & Onishi 29030, distributed as P. bromelioides and so cited by me in a previous installment of these notes, appears to represent P. vellozioides Körn. instead, while Irwin, Harley, & Onishi 30225 is P. corymbosus (Bong.) Kunth.

PAEPALANTHUS BRUNNEUS Moldenke

Additional bibliography: Moldenke, Phytologia 25: 158—159. 1973.

Additional citations: GUYANA: Cowan & Soderstrom 2153 (N).

PAEPALANTHUS BRYOIDES (Riedel) Kunth

Additional bibliography: Moldenke, Phytologia 25: 159—161 (1973) and 28: 439. 1974.

Anderson encountered this species at an altitude of 1400 meters on a "shaded ledge under overhang on steep rocky (quartzite) hillside sloping down to gallery forest with seeps and sedge meadows just above the forest", flowering in April.

The Anderson, Stieber, & Kirkbride 36092, distributed by the New York Botanical Garden as "Paepalanthus bryoides (Riedel) Kunth Det. H. Moldenke, 1972" is actually P. vellozioides Körn. The erroneous statement on its accompanying labels doubtless has resulted from an error in transcription by the typist, since I did not so report the identification!

Additional citations: BRAZIL: Minas Gerais: W. R. Anderson 8471 (Ld); Anderson, Stieber, & Kirkbride 35232 (N, W—2709820), 35643 (N, W—2709819); Hatschbach 27447 (S, W—2706783). Paraná: Hatschbach 33472 (Ld). MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 10 (sup.). 1831 (N, Z).

PAEPALANTHUS CAESPITITUS Mart.

Additional bibliography: Moldenke, Phytologia 26: 138. 1973.

Additional citations: BRAZIL: Minas Gerais: Martius 1082 [Macbride photos 10577] (Mu--cotypte).

PAEPALANTHUS CALDENSIS Malme

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158, map 1777, & Ind. 20. 1972; Moldenke, Phytologia 26: 469. 1973.

Recent collectors describe this plant as an "erva, 0.05 m. alt., flôr branca" and have encountered it in "banhado de campo" at altitudes of 750 to 1300 meters, flowering in November and December.

The photograph of Ule 1620, cited below, represents a specimen deposited in the herbarium of the Staatsinstitut für Allgemeine Botanik in Hamburg which has been seen and annotated by me.

Additional citations: BRAZIL: Paraná: Braga 1503 (Rd—26164); Hatschbach 32759 (Gz). Rio Grande do Sul: K. Emrich 56915 (Rd—12285); Rambo 56442 (Rd—12284). Santa Catarina: Klein 3321 (Ld), 3406 (Ld), 3494 (Ld), 3876 (Ld), 4470 (Ld); Reitz 6658 (Ac);

Reitz & Klein 7705 (Ac), 7903 (Ld), 7918 (Ac), 14124 (Ld); Ule 1620 (Z—photo).

PAEPALANTHUS CALVUS Körn.

Additional bibliography: Moldenke, *Phytologia* 26: 141--142. 1973.

Additional citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 28748 (N).

PAEPALANTHUS CANESCENS (Bong.) Körn.

Additional bibliography: Moldenke, *Phytologia* 26: 469 (1973) and 29: 192. 1974.

Examination of authentic material of this species now convinces me that the following collections, previously cited by me as this species, actually all represent P. incanus (Bong.) Körn. instead: Anderson, Stieber, & Kirkbride 35467, M. A. Chase 10365, Duarte & Graziela Barroso s.n. [A. P. Duarte 7934; Herb. Brad. 27771], Irwin, Maxwell, & Wasshausen 20803, Irwin, Reis dos Santos, Souza, & Fonsêca 22363, 22662, & 22909, Mexia 5748, Schwacke 8477 [Herb. Jard. Bot. Belo Horiz. 2967] & 8482 [Herb. Jard. Bot. Belo Horiz. 26665], and Williams & Assis 6901.

PAEPALANTHUS CANESCENS var. ATRATUS Moldenke, *Phytologia* 29: 192. 1974.

Bibliography: Moldenke, *Phytologia* 29: 192. 1974.

Citations: BRAZIL: Goiás: W. R. Anderson 6636 (Z--type).

PAEPALANTHUS CAPANEMAE Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 26: 146--147. 1973.

Anderson describes this plant as an herb with white flower-heads and found it growing on a seeping hillside in a "region of rocky sandstone hilltop cerrado, seeping hillsides, rocky open cerrado in raised places on hillsides, and open mesophytic woods by stream", at an altitude of 1600 meters, flowering in March.

Additional citations: BRAZIL: Goiás: W. R. Anderson 6468 (Ld).

PAEPALANTHUS CAPILLACEUS Klotzsch

Additional synonymy: Paepalanthus hippotrichophyllus Herzog in Fedde, *Repert. Spec. Nov.* 29: 208--210, pl. 121, fig. m--o. 1931. Paepalanthus (Eupaep., Vivipari) hippotrichophyllus Herzog ex Fedde & Schust. in Just, *Bot. Jahresber.* 59 (2): 20. 1939.

Additional bibliography: Herzog in Fedde, *Repert. Spec. Nov.* 29: 208--210, pl. 121, fig. m--o. 1931; A. W. Hill, *Ind. Kew.* 9: 199. 1938; Fedde & Schust. in Just, *Bot. Jahresber.* 59 (2): 20. 1939; Wangerin & Krause in Just, *Bot. Jahresber.* 60 (1): 455 [73]. 1941; Worsdell, *Ind. Lond. Suppl.* 2: 183. 1941; Moldenke, *Known Geogr. Distrib. Erioc.* 6, 13, 29, 46, 49, & 60. 1946; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 63, 66, 85, 208, & 209. 1949; Moldenke, *Résumé* 72, 75, 96, 98, 279, 486, & 487.

1959; Moldenke, Résumé Suppl. 1: 6. 1959; Moldenke, Fifth Summ. 1: 124, 130, 159, 162, & 479 (1971) and 2: 496, 579, 949, & 952. 1971; Moldenke, Biol. Abstr. 56: 5374 & 7484. 1973; Moldenke, Phytologia 25: 242 (1973) and 26: 147 & 188--190. 1973.

Additional illustrations: Herzog in Fedde, Repert. Spec. Nov. 29: pl. 121, fig. m--o. 1931.

Paepalanthus hippotrichophyllus is based on Lützelburg 21408, collected at "Igarape Cre-Cru unter Wasser flutend....Der Fundort liegt wohl im Strombereich des Rio Oyapock", supposedly in the state of Pará, Brazil. Macbride photographed the type specimen in the Munich herbarium as his type photograph number 18703. Herzog (1931) comments that "Die neue Art zeichnet sich durch einen recht abweichenden Habitus vor den meisten Paepalanthus aus und konnte nach ihren ganzen Aussehen am ehesten für ein Eriocaulon gehalten werden. Besonders ins Auge fallend ist die Masse der pferdehaar-ähnlichen verbogenen Blätter und das mächtige Wurzelwerk. Dazu kommen die schwammig-binsenartigen Schäfte, die kleinen, oftens mit Blattschöpfen proliferierenden Köpchen und das eigentümliche schwarzliche Kolorit, das wohl auf den Einfluss des Standortes zurückzuführen ist. An den Blüten, die in ihrem Bau keinerlei Abweichung vom Gattungstypus zeigen, interessiert vor allem das Auftreten mächtiger papillosen goldgelber Anhangsel zwischen den 2-lappigen bandförmig breiter Narbenschenkeln und die feinere Struktur der auffallend kurzen, nicht keulenförmigen, aussen glatten, innen schwach tuberkulaten Haare die bei 2 und 4 Blüten jeweils nur die eingebogene Spitze der Kelchblätter in burstenartiger Zusammendrängung bedecken. Die submers-aquatische Lebensweise ist in der Gattung Paepalanthus nicht häufig und wohl die Ursache für die Eriocaulon-ähnliche Tracht der vorliegenden Art. Dem Wasserleben entspricht auch die aller Sklerenchymbalken entbehrende Struktur der Schäfte, die abgesehen von dem 2-schichtigen kleinzelligen und derbwandigen Rindenzyylinder ganz schwammig gebaut sind."

Additional citations: GUYANA: Cowan & Soderstrom 2125 (N). BRAZIL: Minas Gerais: Brade 13601 [Herb. Jard. Bot. Rio Jan. 25387] (B, Z). Pará: Lützelburg 21408 [Macbride photos 18703] (Mu, Mu, N--photo, W--photo), 29871 (Mu).

PAEPALANTHUS CAPILIACEUS var. SPIRALIS Moldenke

Additional bibliography: Moldenke, Phytologia 26: 190. 1973.

Additional citations: GUYANA: Maguire & Fanshawe 32292 (Mu--isotype).

PAEPALANTHUS CAPITO Körn.

Additional synonymy: Paepalanthus ruficeps Körn., in herb. [not P. ruficeps Ruhl., 1903, nor Alv. Silv., 1928].

Additional bibliography: Moldenke, Phytologia 26: 192--193. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35568 (N); Hatschbach 30232 (N); Martius s.n. [Serro

Frio, prope Tejuco; Macbride photos 18696] (Mu--type).

PAEPALANTHUS CARDONAE Moldenke

Additional bibliography: Moldenke, *Phytologia* 26: 193. 1973.

Steyermark encountered what appears to be this species growing in large clumps in open places at the end of an island, at an altitude of 400 meters, flowering in July. He describes the leaves as rich-green and soft and the flower-heads as white.

Additional citations: VENEZUELA: Bolívar: J. A. Steyermark 106335 (Z).

PAEPALANTHUS CATHARINAE Ruhl.

Additional bibliography: Moldenke, *Biol. Abstr.* 56: 3000. 1973; Moldenke, *Phytologia* 26: 193--195. 1973.

Recent collectors have found this plant in swamps and Sphagnum swamps, in "banhado de campo" and "num banhado" and describe it as an "erva, flôr creme". They have found it flowering and fruiting in January and February.

The photograph of Ule s.n., cited below, represents a specimen deposited in the herbarium of the Staatsinstitut für Allgemeine Botanik in Hamburg which has been seen and annotated by me.

Additional citations: BRAZIL: Paraná: Hatschbach 25713 (S). Rio Grande do Sul: Rambo 53783 (Rd--12282), 56402 (Rd--12283). Santa Catarina: Mattos 8408 (Rb); Reitz & Klein 14169 (Ld); Ule s.n. [December 1886] (Z--photo).

PAEPALANTHUS CATHARINAE var. **HATSCHBACHI** (Moldenke) Moldenke & Smith

Additional bibliography: Moldenke, *Biol. Abstr.* 56: 3000. 1973; Moldenke, *Phytologia* 26: 194 & 195. 1973.

Recent collectors have found this plant growing in "banhado de campo", at 1000 to 1400 meters altitude, flowering in October, December, and February. Reitz & Klein describe it as an "erva, flôr branca" or "flôr branco-acinzentado".

Additional citations: BRAZIL: Santa Catarina: Reitz & Klein 7637 (Z), 7905 (Ld), 10161 (Ld), 12379 (Ld), 13495 (Ac).

PAEPALANTHUS CEARAENSIS Ruhl.

Additional bibliography: Braga, *Pl. Bordest.*, ed. 2, 20. 1960; Moldenke, *Phytologia* 26: 195--196. 1973.

Braga (1960) reports the vernacular name "alfinete" as used for this species in Ceará, Brazil, as well as for Centranthus ruber P. DC. of the Valerianaceae and Erythraea centaurium Pers. in the Gentianaceae.

The F. C. Hoehne 3508 [Macbride photos 18697], cited by me as P. cearaensis in 1973, seems on re-examination to be nothing more than P. lamarckii Kunth.

PAEPALANTHUS CHAPADENSIS Alv. Silv., *Fl. Mont.* 1: 232--233, pl. 154. 1928 [not P. chapadensis Ruhl., 1971].

Additional bibliography: Moldenke, Phytologia 26: 196—197. 1973.

PAEPALANTHUS CHIQUITENSIS Herzog

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1928; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; Moldenke, Phytologia 26: 197—198. 1973.

PAEPALANTHUS CHRYSOPHORUS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 200—201. 1973.

Additional citations: BRAZIL: Goiás: Irwin, Harley, & Onishi 29543 (N). Minas Gerais: Hatschbach 27276 (S).

PAEPALANTHUS CILIATUS (Bong.) Kunth

Emended synonymy: Paepalanthus ciliatus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 323. 1863 [not P. ciliatus Kunth Herb. ex Körn. in Mart., Fl. Bras. 3 (1): 326, in syn. 1863].

Additional bibliography: Moldenke, Phytologia 26: 201—202. 1973.

The Paepalanthus ciliatus "Kunth Herb.", referred to in the synonymy above, is a synonym of P. sellowianus Körn.

Additional citations: MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 5. 1831 (N, Z).

PAEPALANTHUS CILIOLATUS Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 226—227. 1973; Moldenke, Biol. Abstr. 56: 5374 (1973) and 57: 679. 1974.

PAEPALANTHUS CLAUSSENIANUS Körn.

Additional synonymy: Actinocephalus claussebianus Körn., in herb.

Additional bibliography: Moldenke, Phytologia 26: 228—230. 1973.

Anderson and his associates have found this plant growing in wet sand on very rocky sandstone hilltops with occasional wet spots, in sandy soil in brejo (sedge meadow) in an area of "gallery forest with adjacent brejo and drier higher slopes with grassy campo or rocky cerrado", and "on wet campo in an area of pebbly cerrado and sandy grassy campo", and describe it as a branched herb 20 cm. to 1.2 m. tall, with white flower-heads. Sick encountered it in cerrado.

Additional citations: BRAZIL: Goiás: W. R. Anderson 10397 (Ac). Minas Gerais: W. R. Anderson 8641 (Ld); Anderson, Stieber, & Kirkbride 35118 (Ub); Hatschbach 27011 (S); Irwin, Fonseca, Souza, Reis dos Santos, & Ramos 27584 (S); Irwin, Harley, & Onishi 28977 (N); Martius 879 [Macbride photos 18698] (Mu—cotype, Mu—cotype, Mu—cotype, Z—cotype); Sick B.647 (Mu). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 43. 1863. (N, Z).

PAEPALANTHUS COLUMBIENSIS Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 231—232 (1973) and 28: 435. 1974.

Saldarriaga & Bakley encountered this plant in marshy areas in open woodland, flowering and fruiting in August.

Additional citations: COLOMBIA: Antioquia: Saldarriaga & Barkley 53035 (Id).

PAEPALANTHUS COMOSUS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 233. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35885 (N).

PAEPALANTHUS CONDUPLICATUS Körn.

Additional bibliography: Moldenke, Phytologia 26: 469. 1973.

Killip, in 1935, made this notation on the U. S. National Herbarium sheet of Mexia 5745: "Paep. near conduplicatus (Glaz. 15525) at Paris". I regard the Mexia collection as a mixture of P. planifolius var. conduplicatulus Ruhl. and P. planifolius var. globulifer (Alv. Silv.) Moldenke & Smith.

PAEPALANTHUS CORDATUS Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 237—238. 1973.

Irwin and his associates describe this plant as an erect herb, to 1.5 m. tall, with light-gray flower-heads, refer to it as "occasional in cerrado" at altitudes of 950—1200 meters, and found it flowering in March. Material has been misidentified and distributed in some herbaria as P. acanthophyllus Ruhl. and P. amoenus (Bong.) Körn.

Additional citations: BRAZIL: Goiás: Irwin, Grear, Souza, & Reis dos Santos 13588 (N), 14300 (Ca—1381725, N).

PAEPALANTHUS CORYMBOSUS (Bong.) Kunth

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 15. 1833; Moldenke, Phytologia 26: 239—241. 1973.

Irwin and his associates describe this plant as caespitose, the inflorescences on "axes to 20 cm. long", the flower-heads light-gray, and found it growing in crevices on steep iron-rich rocky slopes near the summit, at altitudes of 1800 to 2000 meters, flowering in January.

Material has been misidentified and distributed in some herbaria as P. bromelioides Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 30225 (Ac, N, W—2709817). MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: 233—234, pl. 18. 1832 (N, Z).

PAEPALANTHUS COSTARICENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 26: 241. 1973.

Additional citations: COSTA RICA: Cartago: Croat 398 (E--2056403); J. León 2708 (Mu).

PAEPALANTHUS COUTOENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 26: 241--242. 1973.

Recent collectors have encountered this plant in the restinga formation, flowering in February. They describe it as 40 cm. tall, the "inflorescências arroxeadas" (Belém & Pinheiro 2485) or with white flowers (Belém & Pinheiro 2113). Material has been misidentified and distributed in some herbaria as P. plumipes Alv. Silv. and P. polyanthus (Bong.) Kunth.

Additional citations: BRAZIL: Bahia: Belém & Pinheiro 2113 (N), 2485 (Ld, N). Guanabara: Krapovickas, Cristóbal, & Maruñak 23209 (Ld). Minas Gerais: Irwin, Maxwell, & Wasshausen 20701 (N).

PAEPALANTHUS CRASSICAULIS Körn.

Additional bibliography: Moldenke, Phytologia 26: 242--243 & 480. 1973.

Pring reports encountering this plant on a savanna in Colombia.

Additional citations: COLOMBIA: Cundinamarca: Daniel s.n. [2. 2.1909] (Mu); Pring 164 (E--904837). VENEZUELA: Trujillo: J. A. Steyermark 105022 (S). PERU: Department undetermined: Ruiz & Pavon s.n. [1777-1788] (E--1612101).

PAEPALANTHUS CRYOCEPHALUS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 244. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35827 (N).

PAEPALANTHUS DICHOTOMUS Klotzsch

Additional bibliography: Moldenke, Phytologia 26: 252--253. 1973; Hocking, Excerpt. Bot. A.23: 290. 1974.

PAEPALANTHUS DICHOTOMUS var. BRASILIENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 26: 253. 1973; Hocking, Excerpt. Bot. A.23: 290. 1974.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27425 (S--isotype).

PAEPALANTHUS DISTICHOPHYLLUS Mart.

Additional bibliography: Mart., Erioc. Selbst. Pflanzenfam. 23. 1833; Moldenke, Phytologia 26: 469. 1973.

Anderson and his associates found this plant growing in an area of sandstone outcrops with shrubby vegetation, adjacent grassy slopes, and the valley of a small stream, mostly sandy soil but with overlying black humus in many places, at an altitude of 1550 meters, flowering and fruiting in February, and describe it as 1.7

m. tall, with white flower-heads.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35863 (Ub); Hatschbach 27372 (S); Martius s.n. [Itambé, summus mons; Macbride photos 18699] (Mu--type, Mu--isotype). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 44 III. 1863 (N, Z).

PAEPALANTHUS DIVARICATUS (Bong.) Kunth

Additional bibliography: Moldenke, Phytologia 26: 249 & 258--260. 1973.

The Martius s.n. [Serro Frio], distributed as P. divaricatus, seems to be P. ramosus (Wikstr.) Kunth instead.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35454 (N). MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 3. 1831 (N, Z).

PAEPALANTHUS DOMINGENSIS Ruhl.

This taxon is conspecific with P. repens (Lam.) Körn., which see.

PAEPALANTHUS DUBIUS Körn.

Additional bibliography: Moldenke, Phytologia 26: 262. 1973.

The J. E. Pohl s.n. [in Brasilia], distributed as P. dubius, is actually P. lanato-albus Mart.

PAEPALANTHUS DUIDAE Gleason

Synonymy: Paepalanthus dudidae Moldenke, Biol. Abstr. 57: 679, sphalm. 1974.

Additional bibliography: Moldenke, Phytologia 26: 470. 1973; Moldenke, Biol. Abstr. 57: 679. 1974.

Additional citations: VENEZUELA: Amazonas: Maguire, Wurdack, & Bunting 37123 (Mu).

PAEPALANTHUS DUPATYA Mart.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158 & Ind. 20. 1972; Moldenke, Phytologia 26: 470--471. 1973.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36148 (N).

PAEPALANTHUS ELONGATUS (Bong.) Körn.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158 & Ind. 12 & 20. 1972; Moldenke, Fifth Summ. 1: 161 & 480 (1971) and 2: 492, 499, 581, & 951. 1971; Moldenke, Phytologia 26: 473--479 (1973) and 29: 192. 1974; Hocking, Excerpt. Bot. A.23: 292. 1974.

The Martius collection, cited below, appears to be a mixture with var. ciliatus Körn.

Additional citations: BRAZIL: Goiás: Irwin, Greear, Souza, & Reis dos Santos 14564 (Ld). Minas Gerais: Martius s.n. [arenosis

apricis ad Vao do Paruán et alibi], in part (Mu).

PAEPALANTHUS ELONGATUS var. ANGUSTIFOLIUS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 475. 1973.

Irwin and his associates describe this plant as caespitose, the culms to 70 cm. tall, and found it growing on rocky campos, at 1250 meters altitude, in flower and fruit in March.

Citations: BRAZIL: Goiás: Irwin, Greear, Souza, & Reis dos Santos 13351 (Ld, Z).

PAEPALANTHUS ELONGATUS var. CILIATUS Körn.

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158 & Ind. 20. 1972; Moldenke, Phytologia 26: 474--477. 1973.

Anderson found this plant growing in "campo limpo in sandy soil, wet in some places", at 1080 meters altitude, and describes it as a perennial herb with white flower-heads.

Additional citations: BRAZIL: Goiás: W. R. Anderson 8045 (Ub). Minas Gerais: Martius 877 [Macbride photos 18701] (Mu--cotype, Mu--cotype), s.n. [arenosis apricis ad Vao do Paruán et alibi], in part (Mu, Mu); J. E. Pohl s.n. [in Brasilia] (Mu).

PAEPALANTHUS ELONGATUS f. GRAMINIFOLIUS Herzog

Additional bibliography: Moldenke, Phytologia 26: 477--478. 1973.

The actual type specimens of this form in the Munich herbarium is inscribed "Serra do Rio de Contas, 1000 m. 1914/VII".

Additional citations: BRAZIL: Bahia: Lützelburg 72 [N. Y. Bot. Gard. type photos new ser. neg. 8849] (Mu--type, N--photo of type, Z--photo of type).

PAEPALANTHUS ELONGATUS var. LONGIBRACTEATUS Moldenke, Phytologia 29: 192. 1974.

Bibliography: Moldenke, Phytologia 29: 192. 1974.

Citations: BRAZIL: Goiás: Irwin, Greear, Souza, & Reis dos Santos 12374 (Z--type).

PAEPALANTHUS ELONGATUS var. NIGER Moldenke

Additional bibliography: Moldenke, Phytologia 26: 478. 1973; Hocking, Excerpt. Bot. A.23: 292. 1974.

Additional citations: BRAZIL: Goiás: Irwin, Harley, & Smith 32187 (N--isotype).

PAEPALANTHUS ELONGATUS var. PUBESCENS Alv. Silv.

Additional bibliography: Moldenke, Phytologia 26: 475 & 478--479. 1973.

Anderson encountered this plant in "campo limpo" on sandy soil, wet in some places, at an elevation of 1080 meters, flowering in April, and describes it as a perennial herb with white flower-heads.

Additional citations: BRAZIL: Goiás: W. R. Anderson 8036 (Ld),

8044 (Ld). Minas Gerais: Irwin, Harley, & Onishi 29039 (N).

PAEPALANTHUS ENSIFOLIUS (H.B.K.) Kunth

Additional bibliography: Wikstr., K. Svensk. Vet. Akad. Handl. Stockh., ser. 2, 1: 79. 1820; Wikstr., Trenne Mya Art. Örtsl. Ericoc. 14 (repr.). 1821; Moldenke, Phytologia 26: 479—481. 1973.

The Daniel s.n. [2.2.1909], distributed as P. ensifolius, is actually P. crassicaulis Körn.

PAEPALANTHUS EURYPHYLLUS Ruhl.

Additional bibliography: Moldenke, Phytologia 26: 484. 1973.

Anderson and his associates found this plant growing in an area of hillsides with secondgrowth forest and bracken-covered campos, sloping down to a river, with blocky sandstone and sandy soil.

Citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35679 (N, Z); Magalhães Gomes 1654 [Macbride photos 10603] (B—type, N—photo of type, N—photo of type, W—photo of type, Z—iso-type); Mello Barreto 4655 [Herb. U. S. Nat. Arb. 236404; Herb. Jard. Bot. Belo Horiz. 17549] (W—2121713).

PAEPALANTHUS EXIGUUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 314. 1863.

Synonymy: Eriocaulon exiguum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 627, [pl. 59]. 1831. Paepalanthus exiguus Körn. in Mart., Fl. Bras. 3 (1): 314. 1863. Dupatya exigua (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya exigua Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus exigus (Bong.) Korn. ex Moldenke, Phytologia 28: 460, in syn. 1974.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 627, [pl. 59]. 1831; Bong., Ess. Monog. Erioc. 27. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 574 & 613. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 314 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 26, 182, 183, [283], 285, & 290. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291] & 293, fig. 11 D 8—16. 1908; Alv. Silv., Fl. Mont. 1: 406. 1928; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 52. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 34, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 142. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 97, 280, 288, 324, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 401. 1960;

Renné, Levant. Herb. Inst. Agron. 70. 1960; Moldenke, Fifth Summ. 1: 161 & 480 (1971) and 2: 500, 582, & 951. 1971; Moldenke, Phytologia 28: 460. 1974.

Bongard (1831) describes this species as follows: "acaule, foliis linearibus acutis glabris; pedunculis fasciculatis pubescentibus; vaginis folia adaequantibus glabris. T. LIX. Habitat in graminosis humidis prope Ilheos, provinciae Bahiensis, et in provincia Minas Geraes. Floret.....". The former collection was made by Ludwig Riedel (unnumbered) in grassy damp places at Ilheos, flowering in June, and the latter by the same collector in damp meadows in the Serra do Carassa, both deposited in the Leningrad herbarium. The species has also been found growing in campos and on rocky ground, flowering in February, April, June, November, and December. Anderson and his associates encountered it in wet shady places under a sandstone ledge, mixed with P. miser Ruhl., at 1000 to 1050 meters altitude, in an area of steep rocky hillsides below sandstone cliffs, a stream at the base of the hills, and recently burned campo between the hills.

Although Jackson (1893) cites a plate "59" in Bongard's work as illustrating this species -- as Bongard himself does (1831) -- Kunth (1841) assures us that this plate was never published. Probably it exists only in the Leningrad library or herbarium.

Ruhland (1903) cites from Bahia: L. Riedel s.n., and from Minas Gerais: Burchell 5656, Glaziov 17848, Langsdorff s.n., H. Magalhães s.n. [Herb. Com. Geogr. & Geol. Minas 1290], L. Riedel s.n., Schwacke 7314 & 9236, and A. Silveira s.n. [Herb. Com. Geogr. & Geol. Minas 2980], all deposited in the Berlin herbarium. Silveira (1928) cites a no. 253 from near Ouro Preto, collected in 1900, but whether collected by himself or by someone else is not clear.

The J. A. Steyermark 57894, distributed as P. exiguus, is a mixture of P. lamarckii Kunth and Syngonanthus gracilis (Körn.) Ruhl., while the Williams & Assis 6864, cited below, is a mixture of P. exiguus and P. gyrotrichus Ruhl.

Additional citations: BRAZIL: Amazonas: Fröes & Addison 29299 (Z). Minas Gerais: Anderson, Stieber, & Kirkbride 35637 (Ld, N); Burchell 5656 (Br); Magalhães Gomes 3967 (N); Mendes Magalhães 4358 [Herb. Jard. Bot. Belo Horiz. 45243] (N); Williams & Assis 6864, in part (N). Pará: Ducke s.n. [Herb. Mus. Goeldi 11430] (Z). Roraima: Black & Magalhães 51-12924 (N). LOCALITY OF COLLECTION UNDETERMINED: Herb. Inst. Agron. Norte 10 (Z).

PAEPALANTHUS EXIGUUS var. LONGIFOLIUS Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291] & 293, fig. 11 D 8--16. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291] & 293, fig. 11 D 8--16. 1908; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 97 & 487. 1959; Moldenke, Fifth

Summ. 1: 161 (1971) and 2: 951. 1971.

Illustrations: Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291], fig. 11 D 8--16. 1908.

This variety is based on Damazio 712, collected in swamps on the Morro da São Sebastião, Minas Gerais, Brazil, in September of 1904, and deposited in the Herbario Boissier at Geneva. Beauverd (1908) describes the plant as "Differt a forma typica foliis vix duplo longioribus, recurvatis; caetera ut in typus". He comments that "Cette plante minuscule a été signalée dans l'Etat de Bahia et paraît commune dans celui du Minas Geraes, dont Ruhland cite une demi-douzaine de provenances différentes. L'une d'elles est exactement celle d'où notre zélé correspondant M. Damazio nous l'a envoyée: la seule différence réside dans la date de floraison qui est fin septembre pour notre plante tandis qu'elle est notée en novembre dans l'Herbier de la Commission géographique de Minas, No. 2980: il se pourrait que cette variation dans la date de floraison d'une même station coïncidât avec la différence que nous avons notée pour la forme des feuilles, et à laquelle l'on pourrait ajouter celle des bractées stipantes, qui selon Koernicke sont de même forme que les bractées involucrentes, tandis qu'elles en diffèrent très sensiblement chez les échantillons que nous avons examinés et desquels nous donnons une illustration."

The variety is thus far known only from the type collection.

PAEPALANTHUS EXTREMENSIS Alv. Silv., Fl. Mont. 1: 163--164, pl. 103. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 163--164 & 406, pl. 103. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 97 & 487. 1959; Moldenke, Fifth Summ. 1: 161 (1971) and 2: 951. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 103. 1928.

This species is based on A. Silveira 818, collected along the margins of the Rio Extrema, near Grão Mogol, Minas Gerais, Brazil, in July of 1926, and is deposited in the Silveira herbarium. Silveira (1928) comments that the species as "A P. coloidi Ruhl. foliis minoribus facile distinguitur". Prance & Silva describe the plant as a small herb, frequent in the cerrado zone, flowering in July. Irwin and his associates describe it as a low herb, 15--25 cm. tall, growing on wet slopes in campos or in shallow water in an area of rocky slopes and wet campos, at altitudes of 1000 to 1200 meters, flowering in February, and fruiting in October.

Citations: BRAZIL: Goiás: Irwin, Grear, Souza, & Reis dos Santos 12575 (Ac, N); Irwin, Souza, & Reis dos Santos 9494 (Id, N); Prance & Silva 58198 (N, N, S, W--2584614a, Z).

PAEPALANTHUS FALCIFOLIUS Körn. in Mart., Fl. Bras. 3 (1): 327, pl. 45. 1863.

Synonymy: Eriocaulon (Paepalanthus) rigidum Mart., Flora 24, Beibl. 2: 35. 1841 [not E. rigidum Bong., 1831]. Dupatya falcifolia (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Eriocaulon rigidum Mart. ex Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878, in syn. 1893. Dupatya falcifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus gomesii (Silv.) Ruhl. ex Moldenke, Résumé 325, in syn. 1959 [not P. gomesii Alv. Silv., 1928]. Paepalanthus gomesii Ruhl. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Paepalanthus falcifolius Mart. ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969. Eriocaulon ascendens Bong., in herb.

Bibliography: Mart., Flora 24, Beibl. 2: 35. 1841; Körn. in Mart., Fl. Bras. 3 (1): 283, 327, 328, 499, & 507, pl. 45. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22, fig. 11. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 189, 192-194, [283], 287, & 290, fig. 26. 1903; Alv. Silv., Fl. Mont. 1: 406. 1928; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41 & 52. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 39, & 48. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 401. 1946; Moldenke, Alph. List Cit. 2: 402 (1948) and 4: 1203 & 1297. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 142. 1952; Angely, Fl. Paran. 10: 4. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 97, 280, 291, 325, & 487. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. 70. 1960; Moldenke, Phytologia 19: 103. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 159-161, 167, 173, 174, & 187-189. 1969; Moldenke, Fifth Summ. 1: 161 & 480 (1971) and 2: 510, 582, 583, & 951. 1971; Moldenke, Phytologia 26: 250. 1973.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 45. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22, fig. 11. 1888; Ruhl. in Engl., Pflanzenreich 13 (4-30): 192, fig. 26. 1903.

This species is based on P. Clausen 47, Martius 880, and J. E. Pohl s.n., all from Minas Gerais, Brazil, the first-mentioned from the Serra d'Itabira, but the others with no specific locality noted. The type of Eriocaulon rigidum Mart. is P. Clausen 495, deposited in the Berlin herbarium; the E. rigidum Bong., referred to in the synonymy above, is the name-bringing synonym of Paepalanthus rigidus (Bong.) Kunth. Eriocaulon ascendens is based on Martius 828 in the Munich herbarium.

Magalhães Gomes 2718, in the Berlin herbarium, was annotated by Ruhland as "Paepalanthus gomesii Ruhl., n. sp." after the name P. falcifolius had been crossed out by him, but the specimen seems to me to be identical with the latter taxon. Paepalanthus gomesii Alv. Silv. is an entirely different and apparently valid species.

Irwin and his associates describe P. falcifolius as a decumbent shrub with stems to 75 cm. long and with white flower-heads, and have found it growing in wet campos in an area of cerrado interspersed with wet rocky campo, at 950 meters altitude. It has been collected in anthesis in February and April, growing also in sandy places.

Ruhland (1903) cites from Minas Gerais P. Clausen 47 (Br) & 221 (Br), Magalhães Gomes 3939 (B), Martius 880 (B), and J. E. Pohl s.n. (B). Silveira (1928) cites a no. 247 from Venda do Campo, Minas Gerais, collected in 1894, but whether collected by himself or by someone else is not clear.

Material of this species has been misidentified and distributed in herbaria as P. denudatus Körn., P. falcatus Körn., and P. rigidus (Bong.) Kunth. On the other hand, the G. Gardner 5248, distributed as P. falcifolius, is actually P. denudatus Körn., P. Clausen 267, 313, & 319 are P. ramosus (Wikstr.) Kunth, and P. Clausen 49 is Eriocaulon sellowianum Kunth.

Additional citations: BRAZIL: Minas Gerais: P. Clausen 47 (B--cotype), 64 (S), 495 (B); Irwin, Reis dos Santos, Souza, & Fonseca 23356 (N, Z); Macedo 2758 (N, S); Magalhães Gomes 2718 [Macbride photos 10612] (B, N--photo, N--photo, W--photo), 3939 [Herb. Jard. Bot. Belo Horiz. 26652] (B, N); Magalhães Gomes & Schwacke 2718 [Herb. Jard. Bot. Belo Horiz. 26651] (N); Maguire, Mendes Magalhães, & Maguire 49299 (N); Martius 828 (Mu), 880 [N. Y. Bot. Gard. type photos new ser. neg. 8848] (B--cotype, M--cotype, Mu--cotype, N--photo of cotype, Z--photo of cotype), s.n. [Serro Frio] (B); Mendes Magalhães 1306 [Herb. Jard. Bot. Belo Horiz. 39872] (Be--14809, N, W--2124159); J. E. Pohl s.n. (Mu--cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Körn. in Mart., Fl. Bras. 3 (1): pl. 45. 1863 (B, N, Z).

PAEPALANTHUS FALLAX Beauverd, Bull. Herb. Boiss., ser. 2, 8: 288--290, fig. 10 A 1--10. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 288--290, fig. 10 A 1--10. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 170. 1913; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Prain, Ind. Kew. Suppl. 4, pr. 2, 170. 1958; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 161 (1971) and 2: 951. 1971.

Illustrations: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 289, fig. 10 A 1--10. 1908.

This species is based on Damazio 1502 from Ouro Preto, Minas Gerais, Brazil, deposited in the Herbar Boissier at Geneva. Beauverd (1908) notes that "Cette espèce, voisine du Paepalanthus undulatus Ruhland s'en distingue nettement par ses pédoncules solitaires à l'aisselle des feuilles (et non fasciculés par 5--8), par ses graines sensiblement plus courtes que les feuilles, à orifice tronqué transversalement (obliquement chez P. undulatus): en outre, les stigmates sont profondément bifides, bien que les deux ramifications de chaque branche restent parfois soudées jusqu'au sommet chez plusieurs des fleurs que nous avons examinées. Les appendices, digités-papilleux au sommet, dépassant longement les branches du stigmate; stigmate et appendices sont soudés à la base en un style fusiforme très court. — Les poils du réceptacle et de la base des fleurs sont longuement articulés-aigus; ceux du sommet des sépales et des pétales sont fortement claviformes-articulés, et chez la moitié supérieure des pétales des fleurs femelles, les marges sont également ciliées de poils obtusiuscules, filiformes-articulés."

The species is known thus far only from the original collection.

PAEPALANTHUS FASCICULATUS (Rottb.) Kunth, Enum. Pl. 3: 506. 1841.

Synonymy: Eriocaulon fasciculatum Rottb., Act. Litt. Univ. Hafn. 1: 271, pl. 2, fig. 1. 1778 [not E. fasciculatum Bong., 1831, nor Lam., 1789, nor Weig., 1959, nor Willd., 1959]. Eriocaulon congestum H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: 201. 1816. Eriocaulon congestum Humb. & Bonpl. apud Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 867. 1817. Eriocaulon congestum Kunth apud Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826. Paepalanthus congestus Kunth, Enum. Pl. 3: 505. 1841. Eriocaulon congestum Humb. & Kunth ex Kunth, Enum. Pl. 3: 505 & 613, in syn. 1841. Paepalanthus congestus Humb. & Bonpl. ex Kunth, Enum. Pl. 3: 514. 1841. Paepalanthus fasciculatus Kunth ex Klotzsch in M. R. Schomb., Reisen Brit.-Guian. [Vers. Fauna & Fl. Brit.-Guian.] 3: 896. 1848. Paepalanthus fasciculatus Körn. in Mart., Fl. Bras. 3 (1): 284, 357, & 507. 1863. Paepalanthus congestus Körn. in Mart., Fl. Bras. 3 (1): 505. 1863. Dupatya fasciculata (Rottb.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya fasciculata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus fasciculatus (Rottb.) Körn. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 160. 1903. Paepalanthus fasciculatus f. genuina Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931. Paepalanthus congestus (H.B.K.) Kunth ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Paepalanthus cylindrocephalus Mart. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Paepalanthus fasciculatus (Schrad.) Körn. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Paepalanthus fasciculatus (Rottb.) Kuntze ex Moldenke,

Fifth Summ. 1: 582, in syn. 1971. *Syngonanthus fasciculatus* Black ex Moldenke, Fifth Summ. 1: 636, in syn. 1971.

Bibliography: Rottb., Act. Litt. Univ. Hafn. 1: 271, pl. 2, fig. 1. 1778; J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206 & 867. 1791; L. C. Rich., Act. Soc. Hist. Nat. Paris 1: 113. 1792; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: 201 (1816) and ed. quarto, 1: 252. 1816; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 867. 1817; Wikstr., K. Svensk. Vet. Akad. Handl. Stockh., ser. 2, 1: 76. 1820; Steud., Nom. Bot. Phan., ed. 1, 312. 1821; Wikstr., Trenne Nya Art. Örtsl. Erioc. 11. 1821; Roem. & Schult., Mant. 2: 469. 1824; Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826; Roem. & Schult., Mant. 3: 671. 1827; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Paxt., Pock. Bot. Dict., ed. 1, 124. 1840; Kunth, Enum. Pl. 3: 497, 505, 506, 514, 520, 537, 573, 613, & 624. 1841; Mart., Flora 24: Beibl. 2: 60. 1841; Klotzsch in M. R. Schomb., Reisen Brit.-Guian. 3: [Vers. Fauna & Fl. Brit.-Guian.] 396. 1848; Paxt., Pock. Bot. Dict., ed. 2, 124. 1849; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 275--276 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 284, 357--358, 505, & 507. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1023. 1883; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 401. 1894; Huber, Bol. Mus. Para. 2: 499. 1898; Barnh., Bull. Torrey Bot. Club 29: 585--598. 1902; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 17, 153, 160, [283], 285, 289, & 290. 1903; Herzog in Fedde, Repert. Spec. Nov. 29: 205--206. 1931; H. A. Gleason, Bull. Torrey Bot. Club 58: 327. 1931; Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelsmus. 11]: 216--218. 1938; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5--7, 12, 29, 33, 34, 46, & 48. 1946; Moldenke, Alph. List Cit. 1: 132. 1946; Moldenke, Phytologia 2: 374. 1947; Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 196. 1948; Moldenke, Alph. List Cit. 2: 409 & 556 (1948), 3: 701, 702, 744, 805, 809, 892, 956, & 975 (1949), and 4: 1043, 1074, 1079, 1132, & 1169. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61, 64, 66--68, 84, & 209. 1949; Moldenke, Phytologia 3: 142 (1949) and 4: 142--143. 1952; Moldenke, Mutisia 6: [1]. 1952; Moldenke in Maguire, Mem. N. Y. Bot. Gard. 8: 97. 1953; R. E. Schult., Bot. Mus. Leafl. Harvard Univ. 16 (4): pl. 11. 1953; Uribe, Mutisia 25: 28. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 67, 72, 75, 77, 78, 98, 280, 287, 288, 324, 325, & 487, 1959; Moldenke, Résumé Suppl. 1: 16. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960 and pr. 3, 2: 401. 1960; Moldenke, Résumé Suppl. 3: 12 & 13 (1962), 4: 5 (1962), and 5: 5. 1962; Lindeman & Görts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11] 331. 1968; Moldenke, Résumé Suppl. 18: 10. 1969; Moldenke, Phytologia 20: 295, 297, & 414--418. 1970; Moldenke, Fifth Summ. 1:

118, 125, 130, 132, 134, 161, & 430 (1971) and 2: 497, 500, 580, 582, 636, 951, & 973. 1971; Moldenke, Phytologia 25: 152 & 160 (1973) and 28: 435. 1974.

Illustrations: Rottb., Act. Litt. Univ. Hafn. 1: pl. 2, fig. 1. 1778; R. E. Schult., Bot. Mus. Leaflet, Harvard Univ. 16 (4): pl. 11. 1953.

This widespread species is based on Herb. Rottb. s.n. from Surinam, deposited in the Copenhagen herbarium where it was photographed by Macbride as his type photograph number 22281. The type of Eriocaulon congestum was collected by Humboldt and Bonpland along the banks of the Río Yáo in the primeval forests of the Orinoco, Venezuela, and is deposited at Berlin. Paepalanthus cylindrocephalus is probably based on Spruce 109, in part, from Pará, Brazil.

Although the H.B.K. references in the synonymy and bibliography of this species are often cited as "1815", Barnhart (1902) asserts that both are more correctly given as 1816. The Klotzsch (1848) references are sometimes cited as "8: 96". In both places Paepalanthus fasciculatus "Kunth" is mentioned and thus accredited, with as synonyms Eriocaulon fasciculatum Rottb., Eriocaulon fasciculare Weigelt, and E. caespitosum Poepp. -- the two latter names, however, belong in the synonymy of Paepalanthus bifidus (Schrad.) Kunth.

As to the author-citation for the binomial here adopted for this species, see my discussion under Paepalanthus bifidus in a previous installment of this series of notes. Unless the interpretation here proposed is adopted, the species here under discussion would have to be called P. congestus (H.B.K.) Kunth.

The "Eriocaulon fasciculare L." of Raeuschel, sometimes placed in the synonymy of P. fasciculatus, actually belongs in that of P. lamareckii Kunth.

Kunth (1841) includes Eriocaulon fasciculare Weigelt and "Eriocaulon caespitosum (Wikstr.?)" in the synonymy of P. fasciculatus and cites also "Bong. in Act. Petrop. 1. 1. 624 (excl. Lam.) fide synon. Weigelt. Surin.", but I regard these names as belonging to the synonymy of Paepalanthus bifidus (Schrad.) Kunth. At the close of his description Kunth asks the question "An recte huc relatus? P. polytrichoidi et P. lamareckii tamen simillimus." On page 506 of his work he erroneously says that "E. fasciculatum Bong. est Paepalanthus fasciculatus" -- it really is P. bifidus. He also compares P. fasciculatus with P. bryoides (Riedel) Kunth, P. perpusillus Kunth, Philodice cuyabensis (Bong.) Kunth, and Philodice hoffmannseggii Mart. He also notes that Syngonanthus caulescens (Poir.) Ruhl. "Eriocauli fasciculati fors tantum varietatem giganteam esse, suspicatur Poirot" -- a possibility which is, of course, completely out of the question in light of present knowledge. Steudel (1821) places Eriocaulon

fasciculatum Rottb. doubtfully in the synonymy of E. fasciculatum Lam. [which is now known as Paepalanthus lamareckii Kunth].

It should be noted here that the Eriocaulon fasciculatum of Bongart and of Weigelt, referred to in the synonymy and elsewhere above, are synonyms of Paepalanthus bifidus (Schrad.) Kunth, while that of Lamarck and of Willdenow are synonyms of Paepalanthus lamareckii Kunth.

Uitten & Heyn (1938) cite the H.B.K. reference in the bibliography of this species as "1815", but as indicated above this is incorrect -- pages 201--302 of the folio edition of this work were issued in August of 1816 and pages 153--256 of the quarto edition in May of 1816.

Collectors describe Paepalanthus fasciculatus as an erect herb, 6--15 cm. tall, with white or grayish-white flowering-heads, and with white or brown flowers. They have found it growing in white sand of clearings, coarse white sand of disturbed white-sand savannas, damp or damp sandy places, sandy spots, savannas, savanna forests on white sand, moist sandy soil in dense forests, sandy rocky soil, sandy clearings in woods, open patches near rivers in sand and silt, and in slight shade at the edge of forests, along trails and riverbanks, among litter on roadsides, on sand and sandy roadsides, on rocks, rocky cliffs, and savannas with quartzite base, "common in sand along railroads", and "frequent in sandy soil of open places", at altitudes of 25 to 900 meters, flowering and fruiting from April to February. Wurdack & Adderley describe it as "locally abundant" and Maguire & Wurdack as "locally frequent".

Gleason, in his unpublished flora of Guyana, describes the species as follows: "Softly hirsute; stems slender, 4--20 cm. tall, erect or recumbent; leaves not greatly crowded at the summit, 1--3 cm. long; peduncles very numerous, 3--10 cm. long, the sheaths about equaling the upper leaves; heads 2--4 mm. in diameter, globose, becoming short-cylindric, brownish; bracts acute or obtuse, shorter than the lower flowers and usually concealed. Sandy ground, Tumatumari, Gleason 25 (Venezuela to French Guiana and northern Brazil)." In his 1931 work he characterizes the species as "widely distributed and common throughout tropical America". Actually, it is a widely distributed and very variable species found from Colombia and Venezuela, through the Guianas, to northern Brazil only. The vernacular name, "speldekussens", is recorded for it in Surinam.

The printed label accompanying Lützelburg 22455 is inscribed "Nordbrasilien", but in longhand there is also the statement "Orinoco, Esmeraldas", so it would appear that the specimen was actually collected in what is now Amazonas, Venezuela.

Material of this species has been misidentified and distributed in herbaria as "toward P. fasciculatus f. tenellus Ruhl.", as P. polytrichoides Kunth, Syngonanthus anomalus (Körn.) Ruhl., and S. umbellatus (Lam.) Ruhl. On the other hand, the Sellow 506 and A. Silva 210, distributed as P. fasciculatus, are actually P. bifidus

(Schr.) Kunth, Martius 555 is P. bifidus f. brevipes Moldenke, Fröes 25067 is P. fasciculatus f. proliferus Moldenke, André 1049 Fröes 25067, in part, is P. fasciculatus f. proliferus Moldenke, André 1049 & K.1740 (in part), Baldwin 3222, 3389, & 3543, Cuatrecasas 6976, Fröes 25067 (in part) & 27963, García Barriga & Jaramillo Meijia 17064, H. A. Gleason 25, F. J. Hermann 11145, Goodland & Shawe 23001, Maguire, Wurdack, & Bunting 36420, Murça Pires 704 (in part) & 908 (in part), Murça Pires & Silva 4264 (in part), F. W. Pennell 1543, Pérez Arbeláez & Cuatrecasas 6757, R. E. Schultes 3943 & 5837a, Schultes & Cabrera 17194, Schultes & López 8780, 8837, 9715, & 9860, Schultes, Raffauf, & Soejarto 24210, Spruce 1360, 2128, & s.n. [in vicinibus Obidos], and J. A. Steyermark 57729 are P. fasciculatus f. sphaerocephalus Herzog, Tavares 834 is P. myocephalus (Mart.) Körn., and Tavares 827 is P. tortilis (Bong.) Mart. Hostmann s.n., Maguire & Fanshawe 23560, and Murça Pires & Silva 4708 are all mixtures with P. bifidus, Vareschi & Magdefrau 6646 is a mixture with the type of P. fasciculatus f. proliferus Moldenke, Black 48255, Maguire & Wurdack 34898, Spruce 109, and Steyermark & Bunting 102685 are mixtures with P. fasciculatus f. sphaerocephalus, and Black 48-3050 is a mixture with both P. fasciculatus f. sphaerocephalus and Syngonanthus gracilis (Körn.) Ruhl.

Ruhland (1903) cites the following specimens: VENEZUELA: Humboldt & Bonpland s.n. SURINAM: Hostmann 591, Kegel s.n., Wulfschlägel s.n. FRENCH GUIANA: Leprieur s.n. (Br). BRAZIL: Amazonas: Spruce 109, 1360, & 2198, Ule s.n. All these are deposited in the Berlin herbarium except for the Leprieur collection. Vittien & Heyn (1938) cite the following from Surinam: Boldingh 3910, B. W. 409, Focke 127 & s.n., Hostmann 591, Kegel 1198, Langjou 505, Pulle 42, Splitgerber 702, Versteeg 735, and Wulfschlägel 760, flowering in March, July, August, October, and November, recording the vernacular name "speldekussens".

The García-Barriga 14356 and the Schultes & Cabrera 14970 collections cited below are actually from the border between Amazonas and Vaupés, Colombia, and therefore could have been collected on either side (or both sides) of the border.

Dr. L. B. Smith, who very kindly determined for me the exact geographic position of "Moscofio", where André 1049 & 1079 were said to have been collected, comments that "Those 2 numbers so far apart seem suspicious. Bromels near them are from the lower Magdalena and from the Cauca Valley."

Additional citations: COLOMBIA: Amazonas: Schultes & Cabrera 16436 (Ss). Cundinamarca: André 1079 (F--533553), K.1740, in part (F--533655). Meta: Apolinar-María 166 (F--989654); Cuatrecasas 1992 (F--1330800, W--1773271); Idrobo & Schultes 551 (W--

2029465); Philipson 2376 (Bm, N, W--2056787); Philipson, Idrobo, & Fernandez 1477 (Em, W--2026145). Vaupés. P. H. Allen 3083 (W--1951947); A. Fernandez 2055 (W--2199486); García-Barriga 14299 (W--2173463), 14356 (W--2173495); Humbert & Fernandez 27291 (P); Schultes, Baker, & Cabrera 13068 (Ss, W--2172057); Schultes & Cabrera 12391b (Ss), 13110 (Ss, W--2171100), 14173 (Ss, Ss), 14174 (Ss, W--2171374), 14970 (W--2113107), 15531 (Ss), 18347 (Ss, W--2172129), 19749a (W--2113117), 19954 (Ss, W--2172582).

VENEZUELA: Amazonas: Holt & Blake 463 (S, W--1517864); Lichy 15 (Ve); Lützelburg 22455 (Mu); Maguire & Politi 28309 (Be, F, K, N, Ut, Ve, W); Maguire & Wurdack 34898, in part (Mu, N); J. A. Steyermark 90336 (Ca); Steyermark & Bunting 102685, in part (Ft, Mu), 102696 (Ac); G. H. H. Tate 229 (N), 274 (N); Vareschi & Magdefrau 6646, in part (Ve--42521); L. Williams 14939 (F--1189161); Wurdack & Adderley 42913 (N, S). Bolívar: Koyama & Agostini 7388 (N, N), 7409 (N, N); J. A. Steyermark 90336 (S). GUYANA: Cowan & Soderstrom 1737 (Fg), 1748 (Fg, N); Whitton 13 (K), 250 (K).

SURINAM: Bolander s.n. (S); Boldingh 3910 (Ut--10671, Ut--44070a); Dirven LP.420 (Ut--29222b); Florschütz & Florschütz 821 (N, Ut--80225b), 1662 (Ut--80222b), 1867 (Ut--80223b); Focke s.n. (Ut--358); Gonggrijp 409 (Ut--44071a); Herb. Rottbøll s.n. [Macbride photos 22281] (N--photo of type, W--photo of type); Hostmann 31a (S), s.n. (S, Ut--344); Lanjouw 505 [photo 119/120] (N, Ut--44074a); Lanjouw & Lindeman 102 (N, Ut--17885b), 120 (N), 230 (N, Ut--17884b), 821 (N), 3011 (Ut--17886b); Maguire 23983 (N); Mc Kee 10737 (Ws); Pulle 42 (Ut--44072a); Samuels 236 (N), s.n. [Forest of Zandery, May 31, 1916] (N, W--537963); Versteeg 735 (Ut--357, Ut--44073a); Wulschlägel 760 (Br, Br). FRENCH GUIANA: Hoock s.n. [22 Mai 1957] (P); Leprieur s.n. [Cayenne] (Br). BRAZIL: Amapá: W. A. Egler 1420 [Herb. Mus. Goeldi 24576] (Mi), 1421 [Herb. Mus. Goeldi 24577] (Bm), 47238 (N). Amazonas: Black 48-2555, in part (Be--33291, N, Ut--97894a), 48-3050, in part (Be--36952, N, Ut--98009a); J. Elias 306 [Herb. Brad. 48084] (Z); Frões 12237 (N), 26083 (N), 28044 (Z), 28464 (Be--75262), 28755 (Z); T. Guedes 75 (Be--43298); Holt & Blake 575 (Ut--29330a, W--1519203); Killip & Smith 30162 (Er, N, S, W--1463331); Lanna 314 [Castellanos 23784; Herb. Cent. Pesquis. Florest. 1946] (Ac); Lanna & Castellanos 23706 [Lanna 407; Herb. Cent. Pesquis. Florest. 2132] (Ld); Lützelburg 21960 (Mu), 21993 (Mu); Maas & Maas 462 (N); Murça Pires 704, in part (Be--30178, Be--30178a), 721, in part (Be--30194a), 908, in part (Be--30359, Ca--59921, N, W--222467), 932 [Herb. Jard. Bot. Rio Jan. 65424] (N), 1047 (Be--30476), 1074 (Be--30499); Murça Pires & Black 932 (Ca--743840), 1220 (Be--

18205); Prance, Pena, & Ramos 3865 (Ld, N); Prance, Ramos, Farias, & Coelho 9069 (Ac, N); R. E. Schultes 3943 (W--1953294), 8720 (W--1988599), 8837 (Z), 9715 (Z); Schultes & López 9250 (W--1788651); Spruce s.n. [prope Barra] (S, S); G. H. H. Tate 3 (N). Pará: Killip & Smith 30614 (W--1463626), 30700, in part (N); Murça Pires & Silva 4264, in part (N), 4708, in part (Ut--73001), 4709 (N, W--2252821); Spruce 109, in part (Mu). Roraima: Black 51-13549 (N), 51-13601 (N); Black & Magalhães 51-12921 (Be--70714). LOCALITY OF COLLECTION UNDETERMINED: Vahl s.n. (S). UNPUBLISHED ILLUSTRATIONS: drawings & notes by Körnigke (B).

PAEPALANTHUS FASCICULATUS var. IÇANENSIS Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931.

Synonymy: Paepalanthus fasciculatus var. icanensis Herzog ex Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939. Paepalanthus fasciculatus var. incanensis Herzog ex Moldenke, Known Geogr. Distrib. Erioc. 48, in syn. 1946.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 143. 1952; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 161 (1971) and 2: 582 & 951. 1971.

This variety is based on Lützelburg 22303 and 22448 from Tunuy, Rio Içana, Alto Amazonas, Amazonas, Brazil, collected on October 25 and 26, 1928, and deposited in the Botanical Museum at Munich.

Additional citations: BRAZIL: Amazonas: Black 48-2510 (Be--33247); Lützelburg 22303 [N. Y. Bot. Gard. type photos new ser. neg. 8851] (Mu--cotype, N--photo of cotype, Z--photo of cotype), 22448 (Mu--cotype); Murça Pires 721, in part (Be--30194), 750 (Be--30223). Pará: Ducke 11896 (Z).

PAEPALANTHUS FASCICULATUS f. PROLIFERUS Moldenke, Résumé Suppl. 4: 5, nom. nud. (1962), Bol. Soc. Venez. Cienc. Nat. 23: 300--301. 1963.

Bibliography: Moldenke, Résumé Suppl. 4: 5. 1962; Moldenke, Bol. Soc. Venez. Cienc. Nat. 23: 300--301. 1963; Moldenke, Fifth Summ. 1: 125 & 161 (1971) and 2: 951 & 967. 1971.

The acceptance of the termination "-iferus" in the accepted name for this taxon, as also in P. capillaceus var. proliferus, P. squamuliferus, and Syngonanthus caulescens var. proliferus, will be challenged by some purists, who will probably insist that the masculine form of these words must terminate in "-ifer". However, a letter to me from Dr. H. W. Rickett, dated August 31, 1971, points out that a glance through Linnaeus' "Species Plantarum" (1753) shows that he used the name "Fucus sendigerus". Jackson's "A Glossary of Botanic Terms" (1950) lists bulbiferus, glanduliferus, and spinif-

erus, while Nuttall, in his "Genera" (1818), accepts Cucubalus bacciferus. Dr. Rickett concludes: "So it is best to leave the words as they were published (my usual advice). Forms in -us seem to be respectable, at least in medieval Latin. Of course such words as niger, glaber, integer cannot appear in other form. And procerus is classical Latin."

Material of this form has been distributed in herbaria as typical P. fasciculatus (Rottb.) Kunth, and, in fact, the Vareschi & Magdefrau 6646, cited below, is a mixture with the typical form.

Citations: VENEZUELA: Amazonas: Vareschi & Magdefrau 6646, in part (Ve--42521--type, Z--isotype). BRAZIL: Amazonas: Fróes 25067, in part (N).

PAEPALANTHUS FASCICULATUS f. RIGIDUS Herzog in Fedde, Repert.

Spec. Nov. 29: 205 [as "rigida"]. 1931.

Synonymy: Paepalanthus fasciculatus f. rigida Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 143. 1952; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 161 (1971) and 2: 582 & 951. 1971.

This form is based on Lützelburg 22244 from San Felipe, on the Rio Negro, Alto Amazonas, Amazonas, Brazil, and deposited in the herbarium of the Botanical Museum at Munich.

Additional citations: BRAZIL: Amazonas: Lützelburg 22244 [N. Y. Bot. Gard. type photos new ser. neg. 8850] (Mu--type, N--photo of type, Z--photo of type).

PAEPALANTHUS FASCICULATUS f. SPHAEROCEPHALUS Herzog in Fedde,

Repert. Spec. Nov. 29: 205 [as "sphaerocephala"]. 1931.

Synonymy: Paepalanthus fasciculatus f. sphaerocephala Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 143. 1952; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Résumé Suppl. 5: 5. 1962; Moldenke, Phytologia 20: 418. 1970; Moldenke, Fifth Summ. 1: 125 & 161 (1971) and 2: 582 & 951. 1971; Moldenke, Phytologia 28: 435. 1974.

The type of this rather poorly defined form was collected by Freiherr Philipp von Lützelburg (no. 22931) at São Felipe, on the Rio Negro in Alto Amazonas, Amazonas, Brazil, on October 26, 1928, and is deposited in the herbarium of the Botanical Museum at Munich. Collectors describe the plant as an herb, to 15 cm. tall, with whitish flower-heads and white flowers. It has been found growing in dense or secondary forests, in low scrub on

white sand, rocky sandy soil, savannas, sandy savannas, fine-sand savannas, in "slight shade at edge of forests", and in alkaline soil on steep shaded banks of streamlets in pastures, among rocky outcrops on mountain summits, on sandy open hillsides, on exposed granite, and in the shade of boulders, at altitudes of 25 to 2028 meters, flowering and fruiting in every month of the year. Maguire & Fanshawe refer to it as "locally frequent on white sand", while Maguire, Wurdack, & Bunting describe it as "locally frequent in dense clumps in forest clearings at sabanita edges". Mori encountered it on open sandy roadsides in brushy clearings and secondary rainforests along with many Solanum species.

The R. E. Schultes 3943, cited below, has two in situ photographs included on the sheet. Schultes reports the plant to be "alkaloid-negative".

Material of this form has been widely misidentified and distributed as the typical form of the species and as P. cylindrocephalus Mart. and P. polytrichoides Kunth. Snethlage 8187 is a mixture with P. bifidus (Schrad.) Kunth, while Black 48-2555, Maguire & Wurdack 34898, Murça Pires 704 & 908, Spruce 109, and Steyermark & Bunting 102685 are mixtures with typical P. fasciculatus (Rottb.) Kunth and Black 48-3050 is a mixture with P. bifidus and Syngonanthus gracilis (Bong.) Ruhl.

Additional citations: COLOMBIA: Amazonas: R. E. Schultes 3943 (N). Cundinamarca: André 1049 (N), K. 1740, in part (N). Meta: García Barriga & Jaramillo Mejía 17064 (N); F. J. Hermann 11145 (N, N, W--1906238); F. W. Pennell 1543 (F--485405, N, W--1041807). Vaupés: Cuatrecasas 6976 (N, N); Humbert & Schultes 27370 (P); Pérez Arbeláez & Cuatrecasas 6757 (N, N); R. E. Schultes 5837a (N); Schultes & Cabrera 17194 (N, Ss, Z); Schultes, Raffauf, & Soejarto 24210 (Oa). VENEZUELA: Amazonas: Maguire & Wurdack 34898, in part (Mu, N); Maguire, Wurdack, & Bunting 36420 (Mu, N); J. A. Steyermark 57729 (N, S); Steyermark & Bunting 102685, in part (Mu). Bolívar: J. A. Steyermark 86888 (Fg, N, Ve). SURINAM: Lindeman 4228a (W--2559778). GUYANA: H. A. Gleason 25 (N); Goodland & Maycock 452 (M1, N); Maguire & Fanshawe 23001 (N). BRAZIL: Amazonas: J. T. Baldwin Jr. 3222 (N), 3389 (N), 3548 (N); Black 48-2555, in part (W--2655156), 48-3050, in part (W--2655155); Ducke 11206 (Bs), 11539 (Bs), 11638 (Bs); Fróes 25067, in part (N), 27963 (N, Z); Goeldi 3869 (Z); Killip & Smith 30160 (N, S, W--1463330); Lützelburg 22931 [N. Y. Bot. Gard. type photos new ser. neg. 8845] (Mu--type, N--photo of type, Z--photo of type); Mori 305 (Ws); Murça Pires 226 (Be--28191), 704, in part (N, N), 908, in part (N); Pabst 9429 [Herb. Brad. 58033] (Ld); Prance, Maas, Woolcott, Monteiro, & Ramos 15602 (Ac, N); Prance, Ramos, Farias, & Philcox 4837 (Ac, N); Schultes & López 8780 (N), 8837 (N), 9715

(N), 9860 (N); Spruce 932 (Mu), 1360 (B, Br, N, S, S), 2128 (Br, N, S, S). Pará: Cavalcante 86 (Bs); Ducke 9974 (Bs), 12606 (Bs); W. A. Egler 308 (Bs); O. Martins 8156 (Bs); Murça Pires & Silva 4264, in part (N); Snethlage 8187, in part (Bs); Spruce 109, in part (Mu), s.n. [in vicinibus Obidos] (N).

PAEPALANTHUS FASCICULATUS f. TENELLUS Herzog in Fedde, Repert.

Spec. Nov. 29: 205 [as "tenella"]. 1931.

Synonymy: Paepalanthus fasciculatus f. tenella Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939; Moldenke, Known Geogr. Distrib. Erioc. 6, 7, & 48. 1946; Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 196. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64, 67, & 209. 1949; Moldenke, Alph. List Cit. 3: 701. 1949; Moldenke, Résumé 72, 77, 98, 325, & 487. 1959; Moldenke, Résumé Suppl. 3: 12. 1962; Lindeman & Görts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 331. 1968; Moldenke, Fifth Summ. 1: 125, 132, & 161 (1971) and 2: 582 & 951. 1971.

This form is based on Lützelburg 22978 from Esmeraldas, on the Rio Orinoco, Amazonas, Venezuela, collected on October 8, 1928, and deposited in the herbarium of the Botanical Museum at Munich. It has been found growing in disturbed caatinga on white sand and along seepages in wet savannas, at altitudes of 300--400 meters, flowering in March, July, and September. Maguire and his associates describe it as "infrequent on moist escarpments".

Lindeman & Görts-van Rijn (1968) cite Florschütz 1662 and Maguire 24191 & 24677 from Surinam.

The form differs from the typical form of the species in being much smaller and more slender, with very thin peduncles and the flower-heads smaller, globose, and laxly flowered.

The Steyermark & Bunting 102696, distributed as "toward" this form, appears to be the typical form of the species.

Additional citations: VENEZUELA: Amazonas: Lützelburg 22978 [N. Y. Bot. Gard. type photos new ser. neg. 8839] (Mu--type, N--photo of type, Z--photo of type). Bolívar: Maguire, Steyermark, & Maguire 53609 (N); J. A. Steyermark 89689 (Mi, N). BRAZIL: Amazonas: Murça Pires 226 (N); Prance, Coêlho, Maas, & Pinheiro 11659 (Ld, N). Pará: Ducke 16123 (Bs); Murça Pires & Silva 4205 (N, Z), 4208 (N, N).

PAEPALANTHUS FASCICULIFER Alv. Silv., Fl. Mont. 1: 73--74, pl. 42. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 24, 73--74, & 406, pl. 42. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worscell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Alph. List Cit. 2: 412 (1948) and 3: 935. 1949; Moldenke,

Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 443. 1952; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 161 (1971) and 2: 951. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 42. 1928.

The type of this species was collected by Alvaro da Silveira (no. 5) in dry fields in the Serra do Cabral, Minas Gerais, Brazil, in June of 1910, and is deposited in the Silveira herbarium. It is worth noting here that on page 406 of his work, Silveira (1928) cites Silveira 590 from the same locality. Whether this is meant to represent a second collection or merely a correction of the number given on page 73 of the work is not clear. If the latter, then it would be the type collection and the material cited by me should be so indicated.

Additional citations: BRAZIL: Minas Gerais: A. Silveira 590 [Herb. Marie-Victorin 15844] (N--photo, Z--photo).

PAEPALANTHUS FASTIGIATUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 386. 1863.

Synonymy: Eriocaulon fastigiatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 624, [pl. 60]. 1831. Dupatya fastigiata (Bong.) Kuntze, Rev. Gen. Fl. 2: 745. 1891. Paepalanthus fastigiatum Körn. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya fastigiata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 624, [pl. 60]. 1831; Bong., Ess. Monog. Erioc. 24. 1831; Steud., Non. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Fl. 3: 573 & 613. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 275 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 386 & 507. 1863; Kuntze, Rev. Gen. Fl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 128, 151, 153, [283], 285, & 290. 1903; Alv. Silv., Fl. Mont. 1: 83. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 34, & 48. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 98, 280, 288, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Phytologia 20: 422. 1970; Moldenke, Fifth Summ. 1: 161 & 480 (1971) and 2: 500 & 951. 1971.

This species is based on L. Riedel 288 from rocky places in the Serra de São João, Minas Gerais, Brazil, deposited in the Lenin-grad herbarium, collected in the flowering stage in June. Bon-gard's original description (1831), later amplified by Ruhl-land (1903), is "Caule brevi, simplici, folioso; foliis caulinis lanceo-latis, longissime acuminatis, basi sulciliatis, pubescentibus; pedunculis fastigiatis, longissimis vaginisque pubescentibus".

According to Kunth (1841) the original plate 60 which accompanied this description and was cited by Bongard (1831) was never actually published. It probably exists only in the Leningrad herbarium or library.

Ruhland (1903) cites only the type collection, which is apparently the only known collection to date.

PAEPALANTHUS FERREYRAE Moldenke, *Phytologia* 3: 273. 1950.

Bibliography: Moldenke, *Phytologia* 3: 273 (1950) and 4: 143. 1952; E. J. Salisb., *Ind. Kew. Suppl.* 11: 175. 1953; Moldenke, *Résumé* 84 & 487. 1959; Moldenke, *Fifth Summ.* 1: 142 (1971) and 2: 951. 1971.

PAEPALANTHUS FILIPES Moldenke, *Phytologia* 2: 380, nom. nud.

(1947) & in Maguire, *Bull. Torrey Bot. Club* 75: 196--197. 1948.

Bibliography: Moldenke, *Phytologia* 2: 380. 1947; Moldenke in Maguire, *Bull. Torrey Bot. Club* 75: 196--197. 1948; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 66 & 209. 1949; Moldenke, *Alph. List Cit.* 3: 701. 1949; E. J. Salisb., *Ind. Kew. Suppl.* 11: 175. 1953; Moldenke, *Résumé* 75 & 487. 1959; Moldenke, *Phytologia* 20: 297. 1970; Moldenke, *Fifth Summ.* 1: 130 (1971) and 2: 951. 1971.

PAEPALANTHUS FILOSUS Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 164--165. 1903.

Bibliography: Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 3, 164--165, & 290. 1903; Prain, *Ind. Kew. Suppl.* 3: 126. 1908; Alv. Silv., *Fl. Mont.* 1: 127. 1928; Ruhl. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 2, 15a: 41 & 51. 1930; Moldenke, *Known Geogr. Distrib. Erioc.* 12 & 48. 1946; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 84 & 209. 1949; Moldenke, *Résumé* 98 & 487. 1959; Moldenke, *Fifth Summ.* 1: 161 (1971) and 2: 951. 1971; Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1158 & *Ind.* 20. 1972.

This species is based on *Glaziou 19985* from Perpetua near Diamantina, Minas Gerais, Brazil, flowering in April. The type was photographed in the Berlin herbarium by Macbride as his type photograph number 10604. Ruhland (1903) notes that "*Speciei sequenti* [*P. viridulus* Ruhl.] valde similis, vel melius cum ea conjugenda." The only differences he notes between the two taxa are that the sepals of the female flowers are obtuse in *P. filusus* and are subacute in *P. viridulus*. If there are no other differences, it would hardly seem worthwhile to separate them!

Citations: BRAZIL: Minas Gerais: *Glaziou 19985* [Macbride photos 10604] (B--type, Br--isotype, N--isotype, N--photo of type, N--photo of type, W--photo of type); Schwacke *6421* (B, B). São Paulo: A. Lutz *353* (Z).

PAEPALANTHUS FIMBRIATUS Alv. Silv., *Fl. Mont.* 1: 197--198, pl. 130. 1928.

Synonymy: *Paepalanthus fimbriatus* Alv. Silv., *Fl. Mont.* pl. 130,

sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 197--198 & 406, pl. 130. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 293. 1956; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 161 (1971) and 2: 582 & 951. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 130. 1928.

This species is based on A. Silveira 685 from sandy fields in the Chapada do Couto, Minas Gerais, Brazil, collected in April of 1913 and deposited in the Silveira herbarium. Silveira (1928) explains that "Nomen specificum 'fimbriatus' propter aspectum cilliorum bractearum involucrantium dedi."

Citations: BRAZIL: Minas Gerais: Mendes Magalhães 48278 (2).

PAEPALANTHUS FLACCIDUS (Bong.) Kunth, Enum. Pl. 3: 511. 1841.

Synonymy: Eriocaulon flaccidum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 636 & 643, pl. 4. 1831. Paepalanthus juniperinus Kunth, Enum. Pl. 3: 512. 1841. Paepalanthus flaccidus Kunth ex G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: vi & viii, pl. 526. 1843. Eriocaulon juniperinum (Kunth) D. Dietr., Syn. Pl. 5: 260. 1852. Eriocaulon juniperinum Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 282 & 334. 1855. Eriocaulon tortile Steud., Syn. Pl. Glum. 2: [Cyp.] 275. 1855 [not E. tortile Bong., 1831]. Paepalanthus flaccidus var. ♂ Körn. in Mart., Fl. Bras. 3 (1): 320. 1863. Paepalanthus flaccidus var. ♀ Körn. in Mart., Fl. Bras. 3 (1): 320. 1863. Dupatya flaccida (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Eriocaulon juniperinum Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878, in syn. 1893. Dupatya flaccida Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus flacidus Kunth ex Alv. Silv., Fl. Mont. 1: 406, sphalm. 1928. Paepalanthus flaccidus Körn. ex Moldenke, Fifth Summ. 2: 582, in syn. 1971.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 636 & 643--644, pl. 4. 1831; Bong., Ess. Monog. Erioc. 13, 36--37, & 43--55, pl. 4. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 511, 512, 578, 579, 613, & 624. 1841; G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: vi & viii, pl. 526. 1843; Walp., Ann. 1: 891. 1849; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 275, 282, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 320 & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and 2: 402. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 27. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 2, 3, 7, 9, 26, 184--186, [283], 285--287, & 290.

1903; Alv. Silv., Fl. Mont. 1: 406. 1928; Stapf, Ind. Lond. 3: 90 (1930) and 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40, 42, & 43. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 34, 36, 41, 48, & 50. 1946; Moldenke, Alph. List Cit. 1: 223. 1946; Abbiatti, Notas Mus. La Plata Bot. 13: 310. 1948; Moldenke, Alph. List Cit. 3: 710 & 855. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 143--144. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 98, 280, 288, 289, 293, 325, 326, & 487. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and pr. 3, 2: 402. 1960; Eiten in Ferré, Simpos. Sôbre Cerrado 194. 1962; Moldenke, Résumé Suppl. 8: 2. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148, 149, 160, 161, 174, 187, & 189. 1969; Moldenke, Phytologia 20: 416 & 423. 1970; Moldenke, Fifth Summ. 1: 161 & 480 (1971) and 2: 500, 503, 514, 582, 585, & 951. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158 & Ind. 12 & 20. 1972; Moldenke, Phytologia 26: 200 & 247. 1973.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 4. 1831; Bong., Ess. Monog. Erioc. pl. 4. 1831; G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: pl. 526. 1843.

This species is based on L. Riedel 1034 from sandy somewhat damp places in the Serra da Lapa, Minas Gerais, Brazil, collected in flower in November, and deposited in the Leningrad herbarium. The type of Eriocaulon juniperinum is Sellow 5859 from São Paulo, "ad meridiem.", Brazil, and deposited in the Berlin herbarium. Bongard (1831) states that the species is "Valde affine E. bifido Schrad. sed recedit: caule non caespitoso nec bifido; staturaque multo altiore". Körnicke claims (1863) that the typical form has glabrous sheaths, while his var. ♀ (the Eriocaulon juniperinum of Kunth) has pilose sheaths, but in this connection note Ruhland's comment (below).

The Eriocaulon tortile Bong., referred to in the synonymy above, is the name-bringing synonym of Paepalanthus tortilis (Bong.) Mart.

Paepalanthus flaccidus has been found growing in swamps, campos or dry campos, damp or sandy places, and in "brejo" near streamlets, at altitudes of 300--1200 meters, flowering in March, April, June to September, November, and December. Irwin and his associates refer to it as a decumbent herb, the stems to 25 cm. long, and found it growing on lightly wooded shaded slopes.

Material of this species has been misidentified and distributed in some herbaria under the name P. bongardii Kunth. On the other hand, the G. Gardner 5244 and Mello Barreto 6338 & 9844 [Herb. Jard. Bot. Belo Horiz. 25340], distributed as P. flacci-

pus, are actually P. chrysophorus Alv. Silv., while Martius s.n. [prope Cidade de Ouro Preto] is Syngonanthus caulescens (Poir.) Ruhl.

Silveira (1928) cites a no. 249, with no collector designated, from Serra de Lavras, Minas Gerais, collected in 1896. Ruhland (1903) cites from the Berlin herbarium the following specimens: BRAZIL: Goiás: G. Gardner 4379, Glaziou 22294. Minas Gerais: P. Clausen s.n., G. Gardner 4379, Glaziou 15518, 17309, & 19995, L. Riedel 1034, Schwacke 12021 & 12182. São Paulo: Glaziou 17350, Lund s.n., L. Riedel 2291, Schwacke 6616, Sellow 5859. He notes that "Folia angusta et bractee involucrantis exteriores glabrae insignia. Varietates 2 a Koernicke vaginis pubescentibus aut glabris distinctae multis formis intermediis conjunctae sunt. Ceterum species magnitudine capitulorum valde variabilis."

Additional & emended citations: BRAZIL: Distrito Federal: Irwin, Grear, Souza, & Reis dos Santos 14449 (Ld, N); Murça Pires, Silva, & Souza 9515 (B), 9622 (B), 9627a (Z), 9755 (B). Goiás: M. A. Chase 12080 [Herb. Leonard 7654] (B, Mi, W—1495706); G. Gardner 4379, in part (N, S); Glaziou 22294 (Br); E. Santos 1718 [Sacco 1951] (Bd—27116). Minas Gerais: P. Clausen 9 [Kunth 69] (P), 13 (Br), 69 (B), 168 (B), s.n. [Pico d'Itanbira do Campo] (Br, Br), s.n. [Aug.—April 1840] (Br), s.n. [1840] (S); G. Gardner 4379, in part (W—937207, W—1066871); Glaziou 15538 (N), 17309 (Br); Herb. Hort. Osw. Cruz 4951 (Mu); Pereira 2777 [Pabst 3613; Herb. Brad. 3841] (Bd); Regnell III.1264 [21/2/1820] (W—936250), III.1264 [12/3/1847] (S, W—200751), III.1264 [25/2/1870] (S, S); L. Riedel 1034 (B—isotype, Ut—359—isotype); Wainio s.n. [Carassa, IV.1885] (S); Widgren 825 (S), s.n. [X.1845] (S), s.n. [1845] (S, S), s.n. (S). São Paulo: Brade 5535 (S), 6583 (Mu); Eiten & Eiten 1924 (Mu, N); Eiten, Eiten, Felipe, & Freitas Campos 3015 (N, N); F. C. Hoehne 360 (Mu); L. Riedel 2291 (B, M, Ut—360); Sellow 5859 (B, Br, M—photo, Z—photo). State undetermined: Martius 45 (Br), 883 (B, Mu, Mu, S), s.n. [Brasilial] (B, B); Herb. A. Gray s.n. (T); L. Riedel 2191 [San Carlos] (B), s.n. (B, Mu, S); Sellow s.n. [Brasilial] (B, B, Br, M—photo, S, Z—photo). MOUNTED ILLUSTRATIONS: drawings & notes by Körncke (B); Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 4. 1831 (N, Z).

PAEPALANTHUS FLAVICEPS Körn. in Mart., Fl. Bras. 3 (1): 412—413. 1863.

Synonymy: Dupatya flaviceps (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya flaviceps Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 299, 412—413, & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook.

f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 210, [283], & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98, 280, & 487. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158. 1969; Moldenke, Fifth Summ. 1: 162, 480, & 481 (1971) and 2: 951. 1971; Moldenke, Phytologia 26: 243. 1973.

This species is based on an unnumbered Sellow collection from Rio das Pedras, Minas Gerais, Brazil, deposited in the Berlin herbarium, where it was photographed by Macbride as his type photograph number 10605. Thus far the species is known only from this original collection.

Citations: BRAZIL: Minas Gerais: Sellow s.n. [Rio das Pedras; Macbride photos 10605] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS FLAVORUTILUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 144--145. 1903.

Synonymy: Paepalanthus flavo-rutilus Ruhl. ex Alv. Silv., Fl. Mont. 1: 88. 1928.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 127, 144--145, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 88 & 406. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960; Moldenke, Résumé Suppl. 3: 34. 1962; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 583 & 951. 1971; Moldenke, Phytologia 26: 192. 1973.

This species is based on Schwacke 8480 from the Serra do Cipó in Minas Gerais, Brazil, found flowering in the end of April, 1892, and deposited in the Berlin herbarium where it was photographed by Macbride as his type photograph number 10606. Ruhland (1903) cites only the type collection and comments that "Species foliis, bracteis involucrantibus et praecipue indumento capitulorum flavo-rutilo insignis et P. ruficipi Ruhl. proxima." Silveira (1928) cites a no. 233, collector undesigned, from the same Serra do Cipó, collected in 1905.

Citations: BRAZIL: Minas Gerais: Schwacke 8480 [Macbride photos 10606] (B--type, N--photo of type, N--photo of type, W--photo of type).

PAEPALANTHUS FOLIOSUS Körn. in Mart., Fl. Bras. 3 (1): 333--334. 1863.

Synonymy: Dupatya foliosa (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"TERMITES: A WORLD PROBLEM" by Norman E. Hickin, 232 pp., illus., Hutchinson & Co., Publishers, Auckland, Melbourne, Sydney, & London W1; U. S. distributor - St. Martin's Press, Lawrence, Massachusetts 01843. 1971 [U. S. 1972]. \$10.00.

This is one of the careful and valuable reports of the Rentokil Library that describes accurately and in direct simple enough language the anatomy, biology, classification, collection, economic significance and control measures through treatment of soil, drywood, powder, testing procedures, and safety in wood preservation efforts as related to these insects. There is a particularly interesting analysis of the insect orders with reference to the wood-boring habit.

Really ever-increasing and spreading man and his ever-increasing and expanding wooden structures are the ultimate source of the trouble here being discussed, not the termites whose rôle in the basic and continuing ecological balance is to return poorer and dead wood to humus and provide homes and food to other organisms in the interim. Throughout the tropical and semi-tropical parts of the world they exist in great numbers and many species and even extend somewhat into the temperate zones.

Each chapter of this book is well provided with references and helpful illustrations. In a cover pocket there are three excellent large charts of termite anatomy and classification.

This book should prove very helpful in many places and for many students, technicians, teachers, etc.

"THE COCKROACH: Volume I. A Laboratory Insect and an Industrial Pest" by P. B. Cornwell, 391 pp., illus., Hutchinson & Co., Publishers, Auckland, Melbourne, Sydney, & London W1 - U. S. distributor, St. Martin's Press, Lawrence, Mass. 01843. 1968. \$10.00.

This is a scientifically and practically presented report in the Rentokil Library series. Its 435 items in the bibliography, its many clear anatomical drawings and diagrams, and its directly and interestingly written text vouchsafe its wide use by health officers, technicians, students, teachers, and entomologists of many sorts.

In this volume are considered the evolutionary development and classification of roaches, with an identification key to the more common domestic species, correlated anatomy and physiology by systems including mating and ootheca production, movement, environmental limitations and historical dispersal as "man's uninvited

fellow-traveller" with indications that the "American" cockroach arrived in the slave ships out of west African ports and their rôle in disease transmission which is still mainly circumstantial except for the undisputed report by Graffer and Martens back in 1950 in "Le rôle des blattes dans la transmission de salmonelloses". It would seem that roaches have not been checked closely enough by researchers to determine exactly what they do at night with Salmonella typhimurinum and other microbes.

"THE BLUE-GREEN ALGAE" by G. E. Fogg, W. D. P. Stewart, P. Fay & A. E. Walsby, vii & 459 pp., illus., Academic Press, London NW 1 & New York, N. Y. 10003. 1973 [1974]. \$11.50 or \$24.

This is the only modern scientific comprehensive survey of this group of prokaryote cyanophytes available. Fortunately it is an excellent one. Its chapters cover such topics as cellular organization, photosynthesis and chemosynthesis, heterotrophy and respiration, life cycles, freshwater or marine and terrestrial ecology, nitrogen-fixation effects and symbiosis, and, finally, evolution and phylogeny. There is no firm answer yet about parity between endosymbiont blue-greens or cyanelles and chloroplasts in eukaryote green algae.

The many illustrations in the book are very good, the index helpful and the bibliography very full.

"LIVING ANIMALS OF THE BIBLE", text and illustrations by Walter W. Ferguson, 96 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1972 [1973]. \$9.95.

The special feature of this book is the fortunate combination of (1) excellent color printing and format, (2) beautiful alive-looking animal paintings, (3) zoologically correct presentations, (4) interestingly and intelligently prepared text, and all these from the talent, labor, and research of one man - Ferguson. His illustrations have been attractive enough for use in many other books and also accurate enough for reproduction in "AUDUBON" magazine.

Over one hundred animals are mentioned in the Old Testament (which is less than half the number of plants therein mentioned) and almost as many are illustrated here in color. For each is given the Biblical Hebrew name in Sephardic transliteration, the English common name and the "nearest approximation to the scientific name". Biblical quotations are usually taken from the well known King James Version, otherwise from the Revised Standard Version or Anchor Bible if therein more accurate.

Unfortunately his reference to manna leaves the impression of only a single kind and source - scale insect secretion(s) that dry as small balls and fall to the ground from the desert tamarisks on which the insects live. We Moldenkes in our work on "Plants of the Bible" (Ronald Press, New York City, 1952) and in

our various studies since then have suggested that there were three very different types of manna described in the Bible. First the sweet resinous gum exudate or solidifying sap that escapes most commonly after scale insects like Coccus manniparus puncture tender green branchlets or tender green leaf-veins. The sap "bleeds" out probably after the insect has stopped sucking and probably more heavily in the hot dry midday hours when "evaporation pull" is strongest. This product does not pass through the insects' tiny gut where part of it would be absorbed in the form of simple sugars directly for insect needs, the excess leaving as "honeydew" in such tiny particles that only Bedouin aphid ants would collect it but probably not Bedouin people. We also suspect that the highly specialized scale insects are not enzyme-equipped to utilize resins. This type of manna come from the trees and shrubs known scientifically as Tamarix mannifera (Ehrenb.) Bunge [syn. T. gallica var. mannifera Ehrenb. & T. nilotica var. mannifera (Ehrenb.) Schweinf.], Alhagi maurorum Medic. [syn. Hedysarum alhagi L. & Alhagi mannifera Desv.], and Fraxinus ornus L., all of which grow in the Levant. Depending on the location of these shrubs and/or trees, the most suitable weather, the time for the production of the tenderest tissue, and the heaviest feeding/breeding of the scale insects and therefor the greatest escape of the gum, native folks collect their own supplies or later even purchase it — Baruch 1: 10 (not Exodus 16: 4 & 14 as suggested by Ferguson). Any combination of this material containing mannin as "common" fragments, "flakes" or viscid "fat" was the manna used with the burnt offerings in the service of the temple and became the much- and long-used "manna hebraica" of commerce and medicine.

The other two types of manna, both mentioned in that Exodus reference referred to above, do not involve insects or other animals. One type grew up in the night when the ground was moist and "when the sun waxed hot it melted" away or dried out to reappear the next evening or stank "when the heat of the sun fell upon it" but without enough drying for it to revive with the subsequent emergence of dew. This manna was most probably little green colonies of the algae Nostoc spp. which are found under similarly suitable growing conditions in many places in our world. It is not too likely as a source of sustaining human food even under duress because it has only enough to offer nutritionally for short periods of time and grows only when part-time moisture is available and this is usually the non-famine time in the desert or Biblical "wilderness".

The third type of manna — the type that "fell from heaven" — was and is still in times of adversity considered quite edible by man and beast because it comprises the light dried fragmented lichens, Lecanora affinis Eversm., L. esculenta (Pall.) Eversm. and L. fruticulosa Eversm. (and perhaps others), which occupy vast tracts of barren plains and mountains in the then and even now isolated areas. After long periods of drought they curl up,

break free and become airborne in the prevailing winds often for great distances. With changes in wind velocity and/or direction and air temperature they are often dropped to the ground in showers, often forming layers several inches thick. This phenomenon has been recorded in history repeatedly besides the Biblical account from this and other areas. During a great famine period in Persia (Iran) 120 years ago a great airborne shower of these lichens fell "from heaven" to the great joy of the inhabitants who prepared a kind of bread from them. As Ferguson also admits, exhausted migratory quails and/or their dung were not the manna of the Bible even though this was the interpretation of many earlier writers. Their presence just happened to add some additional protein and salts to the diet.

In reference to "honey", we want to comment that Sampson's "bees" in the lion carcass were more likely to have been bumblebees than honeybees and that perhaps the reason why there seems to be no reference to beekeeping in the Old Testament was because the domestic Apis mellifica was not yet introduced and that they "honey" mentioned was either the work of wild native bees or the hardened exudated sap from the inflorescence of the date palm, Phoenix dactylifera. Some accidental injury, some infection, some jaw-cutting by some insects (possibly including bees), and/or some deliberate slashing by man would permit the rich sap to escape and it could readily develop an alcohol content (the "strong drink" of the common people) before solidifying. The "arrack" of many parts of the Orient, including Sri Lanka, India, Pakistan, etc., is still produced thus from the sap of Cocos and other native palms.

This book will delight and enlighten so many readers of all ages and of so many different interests.

"BIOLOGICAL CONTROL BY NATURAL ENEMIES" by Paul DeBach, x & 323 pp., illus., Cambridge University Press, London NW 1 2DB & New York, N. Y. 10022. 1974. \$5.95 paperbound & \$14.95 clothbound.

"The adverse effects of pesticide chemicals on biological control have received relatively little public attention as compared to, say, the widely publicized effects on fish and birds, yet these effects on biological control hold the main key to the whole chain of events leading to the massive proliferation of insecticide usage.....If we can maintain, improve and, when necessary, increase biological control, pesticide chemical usage can be very greatly reduced.....It is as simple as that, and technologically much more readily achievable than is generally realized."

The first chapter explains with proven examples means of "escape from the pesticide dilemma". The others consider parasitic (mostly ichneumonids) and predatory (mostly coleops) insects and pathogenic micro-organisms as functional natural enemies of pests and their ecological impacts, the worldwide efforts of the ex-

plorers for natural enemies, the importance of maximizing biological control research and other methods of biological control — replanting time, rotation, sanitation, pheromone usage, etc.

This is an extremely valuable book interestingly, directly and accurately written and illustrated so as to interest a wide range of readers.

"THE WATER ENCYCLOPEDIA: A Compendium of Useful Information on Water Resources" edited by David Keith Todd, x & 559 pp., illus., Water Information Center, Port Washington, New York 11050. 1970. \$27.50.

This is a "practical reference volume containing a variety of water resources data, facts and statistics". Spot checking for accuracy and coverage makes it safe to infer that the information presented here is carefully, scientifically and effectively presented. "Information is presented in tabular form [revealing rather than obscuring items and relationships], the only text consists of explanatory notes and footnotes to make material readily understandable. To facilitate the rapid location of specific data, particular attention has been given to making the index as complete as possible. Time-dependent data, such as hydropower development in the United States, are identified so that the reader can judge the relation of the information to the current situation or to his particular purpose."

A well chosen list of source books for each section is given. The chapters composed of these sections cover for the U. S. and occasionally for other parts of the world: climate and precipitation, hydrologic elements as runoff and transpiration, surface and ground water with their uses and their quality and quantity, pollution control and resource management, agencies and organizations, and - finally - constants and conversion factors.

This is indeed a valuable compendium of useful information to assist so many workers, including assorted scientists, technicians, students, informable general public, political leaders, etc. It is also a valuable contribution by the editor and the publishing organization for the beginning of the International Hydrological Decade.

"ANNUAL REVIEW OF PHYTOPATHOLOGY" Volume 12 edited by Kenneth F. Baker & associates George A. Lentmyer & Ellis B. Cowling, viii & 502 pp., illus., Annual Reviews, Inc., Palo Alto, California 94306. 1974. \$12.00 U.S.A. & \$12.50 elsewhere prepaid.

This volume consists of 28 papers mainly on results and interpretation of contemporary research, often introduced by historical surveys, and dealing with host-pathogen interactions, environmental influences, epidemiology, toxicant-mycorrhizal

interactions, resistance breeding, other mycotoxins, appraisal of plant disease, and control chemically by heavy metal, biologically and culturally by seed and root bacterization.

Each paper carries its own bibliography. There are author and subject indexes for this volume as well as cumulative ones for volumes 8 to 12, reprint information (\$1 each), and a list of related articles in other "ANNUAL REVIEWS". The individual papers are typically the work of recognized phytopathologists not only from within the U.S. but also from any other spot in the world where such studies are progressing.

VEGETATION DYNAMICS" edited by R. Knapp, Part VIII of "HAND BOOK OF VEGETATION SCIENCE" by Reinhold Tüxen, Editor-in-Chief, vi & 364 pp., illus., Dr. W. Junk b.v. Publishers, The Hague, Netherlands. 1974. 85 Dutch Guilders.

From pages 293 through 356 there is the valuable bibliography for the 27 papers in this volume by 17 authors, making it the amplest available on the subject of vegetation dynamics with even some of the earlier works carrying their own additional reference lists on successional research work, as, for instance, in Lüdi (1930) and Tüxen (1961b). This part alone is worth the 85 guilders in terms of "hunting" time and energy to be saved.

The carefully prepared papers cover: kinds and rates of changes in vegetation by fluctuations and successions; methods of syndynamical analysis and conclusions so supported; cytogenetic, competitive, allelopathic causes of vegetation changes; classifications of successions as evaluated by Dansereau, Whittaker, Alikandrova, Knapp and Aichinger; productivity and chemical changes in successional stages in terms of biomass, nitrogen and ash accumulations; fluctuations in coniferous taiga, grassland and desert; and synchronology dynamics applied to particular geological periods and to particular vegetation units in Europe.

Most of the figures used are published here for the first time. Most of the papers are in English (occasionally stilted but never indistinct in meaning) with the balance of four in German.

It is indeed advantageous to have this volume and the prospect of still others available to theoretical and practical students and scientists dealing with ecological problems.

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NOTES ON CERTAIN TAXA OF THE COMMELINACEAE OF ASIA

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Morton (1966) in his revision of the genus Aneilema R.Br. recognised four genera, viz. Aneilema R.Br. (1810), Murdannia Royle, Dictyospermum Wight (1853) and Tricarpelema J.K. Morton (1966). While laying down the characters for distinguishing the four genera, he re-defined Dictyospermum Wight as follows:

Erect herbs; stems simple; leaves sheathing at the base, entire; inflorescence terminal, flowers solitary or 2-3 aggregated in a short sheathing bract; pedicelled; flowers zygomorphic; petals 3, subequal, the upper one lies between the axis and the ovary; stamens 3, one of them often sterile with a bilobed staminode at least as large as the fertile anthers on the anterior side, occasionally 2 staminodes present on the posterior side, filaments beardless; capsule globose, trilocular, dehiscent, loculi single-seeded seeds oblong, convex and reticulate on the back. $x=14$.

Thus resuscitating the genus Dictyospermum Wight, Morton made with it seven new combinations at species rank. But two of them, viz. D. scaberrimum (Bl.) Morton and D. keyense (Warb.) Morton are not validly published, because he did not give "full and direct reference" to the basionym's "original publication with page or plate reference and date" either at pp. 435-436 where he made the combinations or at page 471 under "References". Further, one of the new combinations, D. conspicuum (Bl.) Morton (cf. Index Kewensis, Suppl. 15, 1973) had already been made by Hasskarl in Commel. Ind.: 22 (1870 (cf. Index Kewensis, Original vol., 1895). D. wightii Hassk. (l.c.: 19), on the other hand, is a superfluous name for D. ovalifolium Wight (1853); Hasskarl had proposed the new name for D. ovalifolium Wight because the latter, according to him, had mostly elliptic leaves, not ovate leaves. Of the remaining species of Aneilema sensu lato from Asia belonging to the section Dictyospermum, and not yet transferred to the genus Dictyospermum Wight, opportunity is taken here to propose two new names/ combinations, as given below.

Again, Morton (l.c.: 436) described the genus TRICARPELEMA but based it on the illegitimate name, Aneilema thomsoni (Clarke) Clarke, because the latter was a superfluous name for Dichospermum giganteum Hassk. (1870), which Clarke (1874, 1877) had cited as a synonym of "Aclisia (?) thomsoni, i.e. Dichospermum giganteum Hassk. Commelynaceae p. 42 Aneilema sp. 11 ex herb. Hook. f. et Thoms. Dr. Hasskarl refers this plant to Dichospermum under the impression that the barren stamens are alternate with the fertile ones". Not only then Tricarpelema thomsoni (Clarke) J.K. Morton is an

illegitimate name but also is not validly published under Article 33 of the Intern.Code Bot.Nomencl.(1972). Tricarpelema giganteum (Hassk.) comb.nov. is herein proposed to replace T.thomsoni (Clk.) Morton. All other species of Dichospermum Wight (1853) from Asia, including the three on which the genus was originally based by Wight, have been transferred to the genus Murdannia Royle (1839).

1. DICTYOSPERMUM SCABERRIMUM (Bl.) Morton ex Panigrahi, comb.nov. Commelina scaberrima Blume, Enum.Pl.Jav.:4 (1827); Aneilema scaberrimum (Bl.) Kunth, Enum.Pl.4:69 (1843); Dictyospermum protensum Wight, Ic.Pl.Ind.Orient.6:30, t.2071 (1853). Syntype: Nepalia, 1821, Wallich 5218 (K, chosen as lectotype); Aneilema protensum Wall. ex Clarke in DC. Monograph. 3:219 (1881); Panigrahi et Kammathy in Proc.Nat.Acad.Sc.India, Sec.B, 33:500 (1963); Dictyospermum scaberrimum (Bl.) Morton in J.Linn.Soc.Bot. London 59:435 (1966) sine relat pag. (not validly published). Distribution: Indian region, Java, Sumatra, Philippines.
2. DICTYOSPERMUM KEYENSE (Warb.) Morton ex Panigrahi, Comb.nov. Aneilema keyense Warb. in Bot. Jahrb. 13:269 (1891); D.keyense (Warb.) J.K.Morton l.c. sine relat pag. (not validly published). Distribution: Papua.
3. DICTYOSPERMUM PHILIPPENSIS Panigrahi, nom.nov. Aneilema humile Merrill in Phil.Journ.Sc.Bot. 13:4 (1918), non Warb. (1891). Distribution: Philippines.
4. DICTYOSPERMUM MONADELPHUM (Bl.) Panigrahi, comb.nov. Commelina monadelpha Bl., Enum.Pl.Jav.1:4 (1827); Aneilema monadelphum (Bl.) Kunth, Enum.Pl.4:70 (1843); A.scaberrimum (Bl.) var. monadelphum (Bl.) Rolla Rao, Notes Roy.Bot.Gard.Edinburgh 15:183 (1964). Distribution: Java.
5. TRICARPELEMA GIGANTEUM (Hassk.) Panigrahi, comb.nov. Dichospermum giganteum Hassk., Commel.Ind.:42 (1870). Type: "Habitat regiones tropicas Sikkim, altitudinine 2-5,000' s.m. ubi legit Hook.f. (hrb.Hook.f.et Thoms. Aneilema 11)" l. Sikkim, Hooker 11, 3 sheets, holotypus et isotypus-K); Aclisia (?) thomsoni Clarke, Commel.et Cyrtandr.Beng.:46, t.31 (1874), nomen superfl. Aneilema (?) thomsoni (Clarke) Clarke in J.Linn.Soc. 15:121 (1877); Panigrahi et Kammathy in Proc.Nat.Acad.Sc.India, Sect.B 33:500, t.12 (1963) nomen superfl.; Tricarpelema thomsoni (Clarke) Morton, Op.cit.:436 (1966) sine relat pag., (not validly published, nomen illegit.) Distribution: Eastern Himalayas.

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STUDIES IN THE HELIANTHEAE (ASTERACEAE). IV.

A NEW SPECIES OF SCHISTOCARPHA FROM PANAMA

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The genus Schistocarpa contains about a dozen species in Central America and western South America with the greatest concentration of species in Guatemala and southern Mexico. One new species has recently been described from Guatemala (Robinson, 1974). Two or three species occur in the countries on each side of Panama but until now only the common widespread S. oppositifolia (Kuntze) Rydb. has been found in the isthmus.

A recent collection by Dr. Thomas B. Croat taken in western Panama proves to represent a thoroughly distinct and previously undescribed species. This new species is particularly unique in the numerous rays in about 3 series all bearing small but distinct laminae. Only the common S. oppositifolia has similar large numbers of female flowers but the latter species has the rays tubular, has much broader leaves, has more scarious and unequal involucre bracts and has less laciniate paleae. The new species is named here after the collector.

Schistocarpa croatii H. Robinson, sp. nov.

Plantae suffrutescentes erectae 1-2 m altae? paucae ramosae. Caulis rubescentes teretes striati parce breviter pilosi. Folia opposita, petiolis 1.5-4.0 cm longis; laminae ovatae 6-10 cm longae 2.5-5.0 cm latae base cuneatae in petiolis superioribus sensim anguste decurrentes prope basin trinervatae margine multo argute serratae apice breviter anguste acuminatae supra et subtus sparsim breviter pilosae, nervis subtus aliquantum dense pilosis. Inflorescentiae laxae paniculatae, pedicellis ca. 1 cm longis dense puberulis non glanduliferis. Capitula ca. 7-8 mm alta et 7-8 mm lata. Squamae involucri ca. 20-22 inaequilongae ca. 4-seriatae 3-5 mm longae et 1.0-1.5 mm latae fulvae oblongae vel late oblongae apice rotundatae margine minute puberulae non scariosae exteriores extus sparsim pilosae. Paleae lanceolatae plerumque profunde bi-tri-laciniatae pallidae margine subscariosae. Corollae flavae; corollae radii ca. 40-60 bi-tri-seriatae, tubis perangustatis 2.5 mm longis dense hispidulis, limbis oblongis ca. 2.5 mm longis et 0.5 mm latis apice profunde bi-trilobatis; corollae disci ca. 30-40 ca. 4.5 mm longae, tubis distinctis angustatis ca. 1.5 mm longis dense hispidulis, limbis anguste infundibularibus subglabris inferne paucae hispidulis, lobis triangularibus ca. 0.6 mm longis et 0.5 mm latis extus submarginaliter multo breviter setiferis; thecae antherarum

ca. 1.2 mm longae, appendicibus ca. 250 μ longis anguste ovatis;
achaeia ca. 1.1 mm longa late obovata glabra vix costata;
carpopodia valde asymmetrica minuta; setae pappi ca. 30 facile
deciduae plerumque 3.5 mm longae. Grana pollinis ca. 25 μ diam.

Type: PANAMA: Chiriqui: Las Nubes near Cerro Punta, ca.
2000 m elev. T.B.Croat 26411 (Holotype, MO).

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III. A new species of Schistocarpha. Phytologia 29 (3):
247-250.



Schistocarpha creatii W. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History



Schistocarpa croatii H. Robinson, enlargement of head.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXIV.

A NEW SPECIES OF SCIADOCEPHALA FROM PANAMA.

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Recent attempts to revise the Adenostemmatinae (King & Robinson, 1974) indicated the existence of three species of Sciadocephala, all from northern South America. Now material of a fourth species has come to our attention from central Panama. The species is described here as new to be available for inclusion in the treatment of the Eupatorieae for the Flora of Panama. The panamanian plant is related to the type species of the genus, S. schultze-rhnhofiae Mattfeld, of Ecuador but differs by the more decumbent habit and the more obovate blunt-tipped more nearly entire leaves. The species is named here for the collector Dr. Robert L. Dressler of the Smithsonian Tropical Biological Institute in Panama.

Sciadocephala dressleri R.M.King & H.Robinson, sp. nov.

Plantae decumbentes 30 cm longae vel longiores herbaceae perennes. Caules breviter rufo-puberuli anguste fistulosi. Folia opposita, petiolis 7-25 mm longis superne indistinctis; laminae ellipticae vel parum obovatae plerumque 10-12 cm longae et 5-6 cm latae base anguste cuneatae margine remote subserrulatae apice obtusae vel rotundatae, nervis subtus sparse puberulis, nervis secundariis paucis binis subbasilaribus valde ascendentibus. Inflorescentiae subcymosae paucae capitatae, pedicellis ca. 1-2 cm longis puberulis. Capitula ca. 8-10 mm alta ca. 3 mm lata; squamae involucri ca. 7-8 uniseriatae 2.0-3.5 mm longae usque ad 1 mm latae anguste oblongae apice rotundatae vel obtuse acute extus sparsim puberulae base vix connatae. Flores ca. 9. Corollae pallido-virides 5.0-5.5 mm longae anguste infundibulares extus sparsim puberulae, tubis indistinctis, lobis triangularibus ca. 0.7 mm longis et 0.5 mm latis; filamenta antherarum in parte superiore ca. 400 μ longa; thecae ca. 1.5 mm longae, appendicibus ovatis ca. 250 μ longis et latis; styli glabri, appendicibus linearibus cremeis. Achaenia usque ad 6 mm longa sparsim minute puberula; carpodia immatura; clavulae pappi 5 plerumque 1.0-1.5 mm

longae, partibus glanduliferis discretis ca. 0.2 mm
longis. Grana pollinis argute spinosa ca. 30 μ diam.

TYPE: PANAMA: Panama. El Llano - Carti highway, about
12 km N of El Llano; 19 July 1974, near stream; corolla
pale green, style cream, Robert L. Dressler 4671
(Holotype MO, Isotype US).

Reference

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ieae (Asteraceae). CXXVII. Additions to the Amer-
ican and Pacific Adenostemmatinae. Adenostemma,
Gymnocoronis and Sciadocephala. Phytologia 29:
1-20.

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Sciadocephala dressleri R.M.King & H.Robinson,
Holotype, Missouri Botanical Garden. Photo by Victor
E. Krantz, Staff Photographer, National Museum of
Natural History.



Sciadocephala dressleri R.M.King & H.Robinson,
Enlargement of heads and inflorescence.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXV.

A NEW SPECIES OF AGERATINA FROM PANAMA.

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Ageratina is one of the largest genera of the tribe Eupatorieae having well over 200 species mostly at medium to higher elevations in Central America and western South America. The diversity in the genus is indicated to some extent by the 19 known from the small region of Costa Rica (King & Robinson, 1972). Only a rather small area of western Panama seems to be suitable for the genus but 6 species are nevertheless known from the country, one being added recently (King & Robinson, 1974). The most recent series of collections by Dr. Thomas B. Croat from Panama include material of a seventh species which is described here as new. Distinctions of the species include the narrowly acuminate trinervate leaves, the less crowded inflorescence, the small heads and the short corolla lobes.

Ageratina croatii R.M.King & H.Robinson, sp. nov.

Plantae suffrutescentes usque ad 1 m altae paucе ramosae. Caules teretes superne aliquantum dense puberuli. Folia opposita, petiolis gracilibus 1.0-2.5 cm longis; laminae ovatae papyraceae 5-8 cm longae et 1.5-4.0 cm latae base breviter cuneatae vel rotundatae trinervatae margine multo duplo-serratae apice anguste acuminatae supra et subtus plerumque in nervis sparsim puberulae, nervis secundariis paucis valde ascendentibus. Inflorescentiae sublaxe late corymboso-paniculatae, pedicellis 1.5-5.0 mm longis dense puberulis. Capitula ca. 4 mm alta; floribus plerumque 10-15; squamae involucri ca. 15 eximbricatae biseriatae subaequilongae lineari-lanceolatae 3.5-4.0 mm longae 0.4-0.5 mm latae bicostatae apice breviter acutae breviter dense fimbriatae non scariosae inferne margine anguste scariosae extus sparsim puberulae; corollae albae ca. 2.3 mm longae, tubis angustatis ca. 1 mm longis extus paucе setiferis, limbis anguste infundibularibus extus paucе setiferis, lobis triangularibus 0.3 mm longis et latis intus glabris extus dense setiferis, setis simplicibus; filamenta antherarum in parte superiore ca. 150 μ longa; thecae antherarum ca. 0.5 mm longae, appendicibus ovato-oblongis ca. 100 μ longis et 120 μ latis; styli inferne leniter nodulosi, appendicibus dense papillois; achaenia ca. 1.3 mm longa superne

valde constricta in costis dense breviter setifera non glandulifera; carpopodia cylindrica ca. 100μ longa, cellulis plerumque elongatis ca. 12μ latis; setae pappi ca. 20 fragiles ad apicem vix latiores, series secundaria brevia distincta. Grana pollinis ca. 20μ diam.

TYPE: PANAMA: Chiriqui. Las Nubes near Cerro Punta, ca. 2,000 meters, August 7, 1974, Thomas B. Croat 26432 (Holotype US, Isotype MO).

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Ageratina croatii R.M.King & H.Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Ageratina croatii R.M.King & H.Robinson, Enlargement
of Heads.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXVI.

FOUR NEW SPECIES OF NEOMIRANDEA.

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Recent collections of Neomirandea from two countries have resulted in the discovery of four new species. The collections are from Costa Rica and Panama which have previously proven to be centers of distribution for the genus. Two new species have been collected by Dr. Thomas B. Croat during his most recent trip to Panama and these are to be included in the treatment for the Flora of Panama. Two new species have been collected by the senior author on a recent trip to Costa Rica.

The efforts of the senior author in Costa Rica have pointed up the important effect of seasonality in the collection of Neomirandea. Most collections have been made during the months of December to February which closely correlates with the dry season in Costa Rica. The last trip was in June, during the rainy season. Many species common at other times of the year were not found and one of the new species was in an area where previous collectors would certainly have noticed it. In addition, N. costaricensis R.M.King & H.Robinson was originally collected by the senior author during the rainy season and it has now been recollected in quantity again in the rainy season. An earlier attempt to recollect the species at its type locality during late January and early February failed. The species, N. eximia (B.L.Robinson) R.M. King & H.Robinson is apparently common at all seasons.

Neomirandea biflora R.M.King & H.Robinson, sp. nov.

Plantae epiphyticae frutescentes subcarnosae ca. 1 m altae paucae vel multo ramosae. Caules teretes glabri inferne usque ad 5 cm diam. Folia opposita anguste petiolata, petiolis plerumque 1-2 cm longis; laminae ovatae plerumque 5-7 cm longae et 2-3 cm latae subcoriaceae base breviter cuneatae margine integrae apice vix acuminatae supra et subtus glabrae, nerviis secundariis pinnatis obscuris. Inflorescentiae late paniculatae usque ad 25 cm latae et 30 cm altae, ramis puberulis. Capitula subsessilia in aggregatis plerumque bina vel ternata ca. 10-12 mm alta. Squamae involucri ca. 20 subimbricatae vel imbricatae ca. 4-5 seriatae valde inaequilongae 1-5 mm longae ca. 1-1.3 mm latae

exteriores ovatae interiores oblongae et laciniatae extus glabrae longitudinaliter atrovittatae. Flores plerumque 2 in capitulo raro 1; corollae ca. 5.5 mm longae late infundibulares lavandulae extus glabrae, tubis et faucibus inferioribus induratis, faucibus intus superne dense hirsutis, lobis elongatis oblongis ca. 2.5 mm longis ca. 0.8 mm latis, cellulis quadratis, parietibus non sinuosis; filamenta in parte superiore ca. 300-350 μ longa; thecae antherarum ca. 1.5 mm longae, appendicibus oblongo-ovatis ca. 400 μ longis et 230 μ latis; styli inferne valde nodulosi glabri; achaenia prismatica ca. 3.5 mm longa subglabra in costis vix remote scabrida; carpodia breviter obturaculiformia, cellulis roundatis ca. 12 μ diam. ca. 8-seriatis; setae pappi ca. 58 apice vix scabrae vix clavatae. Grana pollinis ca. 25 μ diam.

TYPE: COSTA RICA: San Jose: along route 2, ca. 19 kms generally SE of Empalme. Elevation ca. 8,300 ft. June 11, 1974, Robert Merrill King 6762 (Holotype US).

The new species is a member of the typical subgenus with very obvious pubescence inside of the corolla and with a very enlarged style base. The species is most closely related to the two entire-leaved species, N. araliaefolia (Less.) R.M.King & H.Robinson and N. psoralea (B.L.Robinson) R.M.King & H.Robinson, having lacinate inner phyllaries as in the former and deeply cleft corolla lobes as in the latter. The new species differs from both its closest relatives by the reddish color of the corollas and by the mostly two flowers per head.

The plants observed in the field are sometimes 10 or more feet up on trunks of trees but have rhizomes reaching the ground.

Neomirandea croatii R.M.King & H.Robinson, sp. nov.

Plantae epiphyticae frutescentes subcarnosae ca. 1 m altae pauce ramosae. Caules teretes dense hirsuti. Folia opposita breviter anguste petiolata, petiolis plerumque 5-10 mm longis; laminae late ellipticae vel obovatae plerumque 5.5-9.5 cm longae et 3.0-6.5 cm latae subcoriaceae base breviter cuneatae margine integrae apice leniter breviter acuminatae supra sparsim hispidulae subtus sparsim pilosae in nervis densius pilosae. Inflorescentiae late corymbosae usque ad 12 cm altae et 15 cm latae, ramis ultimis 2-9 mm longis

puberulis. Capitula ca. 9 mm alta. Squamae involucris ca. 8-9 subimbricatae ca. 3-seriatae valde inaequilongae 3-6 mm longae et 0.8-1.0 mm latae lineari-lanceolatae apice obtusae extus sparsim minute puberulae et raro glanduliferae; receptacula plana minute puberula. Flores plerumque 5 in capitulo; corollae ca. 7 mm longae anguste infundibulares lavendulae vel purpurascentes intus glabrae extus inferne subglabrae, lobis ovato-oblongis ca. 0.8 mm longis et 0.5-0.6 mm latis extus sparsim glanduliferis et minute puberulis; cellulis subquadratis vel breviter oblongis, parietibus non sinuosis; filamenta in parte superiore ca. 0.7 mm longa; thecae antherarum ca. 1.2 mm longae, appendicibus ovato-oblongis ca. 250 μ longis et 200 μ latis; styli inferne non inflati glabri; achaenia prismatica 2.5-3.0 mm longa subglabra inferne et superne sparsim puberula et breviter setifera; carpopodia distincta brevia, cellulis subquadratis 3-4-seriatis; setae pappi ca. 50 apice vix scabrae vix clavatae. Grana pollinis ca. 25 μ diam.

TYPE: PANAMA: Chiriqui: Las Nubes near Cerro Punta, ca. 2,000 meters elevation, August 7, 1974, Thomas B. Croat 26452 (Holotype US, Isotype MO).

N. croatii has a similar appearance and is probably most closely related to N. chiriquensis R.M.King & H.Robinson which occurs in the same general area of Panama. The new species differs by the puberulous stems, by the more pointed and pubescent leaves which have more prominent secondary veins, by the heads having only 5 florets and by the corollas being puberulous and glanduliferous on the outer surface rather than glabrous.

Neomirandea gracilis R.M.King & H.Robinson, sp. nov.

Plantae suffrutescentes usque ad 1 m altae paucae ramosae. Caules teretes subglabri superne puberuli. Folia opposita breviter anguste petiolata, petiolis ca. 1-2 mm longis; laminae oblongo-ellipticae plerumque 4-8 cm longae et 1.5-3.0 cm latae papyraceae base rotundatae vel breviter cuneatae margine remote distincte serrulatae apice breviter obtuse acute supra sparsim glandulo-punctatae subtus minute sparsim puberulae dense glandulo-punctatae, nervis primariis subtus subpilosis, nervis secundariis pinnatis obscuris. Inflorescentiae parvae corymbosae paniculatae 4.5 cm latae et 3.5 cm altae, ramis puberulis et paucae glanduliferis, ramis ultimis 1.5-6.0 mm longis. Capitula

ca. 6 mm alta et 1.5 mm lata. Squamae involucris fulvi ca. 12 subimbricatae vel eximbricatae ca. 2-seriatae anguste oblongae 1.5-2.5 mm longae et ca. 0.4 mm latae apice anguste rotundatae extus sparsim puberulae et glanduliferae; receptacula glabra. Flores 8-9 in capitulo; corollae ca. 4 mm longae lavendulae anguste infundibulares intus glabrae extus sparsim puberulae et glanduliferae in lobis dense glanduliferae, lobis breviter triangularibus ca. 0.45 mm longis et 0.5 mm latis, cellulis quadratis, parietibus non sinuosis; filamenta in parte superiore angusta ca. 0.5 mm longa; thecae antherarum ca. 0.9 mm longae, appendicibus ovato-oblongis ca. 200 μ longis et 175 μ latis; styli inferne non inflati glabri; achaenia prismatica ca. 1.7 mm longa puberula et glandulifera; carpodia distincta perbrevia, cellulis subquadratis ca. 3-seriatis; setae pappi ca. ca. 32-35 apice parum clavatae acutae. Grana pollinis 20-22 μ diam.

TYPE: PANAMA: Veraguas: Valley of Rio Dos Bocas, along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 kms NW of Santa Fe. Alt. 450-550 meters, 31 August 1974, Thomas B. Croat 27701 (Holotype US, Isotype MO).

The new species is related to N. eximia (B.L. Robinson) R.M. King & H. Robinson and occurs at the extreme eastern edge of the range of the latter. Neomirandea gracilis differs from most specimens of N. eximia by the serrulate more sessile oblong leaves, by the more sparing inflorescence and by the numerous glands on the corolla lobes. Some material of N. eximia from the same province of Panama show similar sparing inflorescences and serrulation which suggests some past hybridization. The new species shares the leaf serrulations and glandular corollas with N. parasitica (Klatt) R.M. King & H. Robinson of Costa Rica but has much more sessile oblong leaves of more herbaceous texture. The Costa Rican species has essentially non-puberulous leaves with much less prominent glandular punctations.

Neomirandea grosvenorii R.M. King & H. Robinson, sp. nov.

Plantae grosse herbaceae vel subarborescentes erectae usque ad 5 m altae non ramosae base erectae. Caules subteretes vel valde striati dense granuloso-puberuli. Folia opposita majuscula longipetiolata, petiolis usque ad 33 cm longis adaxialiter distincte

multilacerate alatis in foliis superioribus valde stipulatis; laminae late deltoideae vel aceriformes palmatae usque ad 32 cm longae et latae grosse dentatae vel vadose lobatae ad apicem vix acuminatae base rotundatae vel truncatae 3-5-nervatae supra sparsim plerumque in nervis puberulae subtus glandulo-punctatae in nervis et nervulis dense granuloso-puberulae. Inflorescentiae corymbosae usque ad 30 cm latae et 15 cm altae, ramis dense puberulis, ramis ultimis 1-4 mm longis. Capitula ca. 10 mm longa et 2.5 mm lata. Squamae involucri fulvae ca. 16 imbricatae 4-5-seriatae ovatae vel oblongae 1.5-7.0 mm longae et ca. 1.5 mm latae apice perbreviter obtusae minute fimbriatae extus glabrae; receptacula glabra. Flores 4-5 in capitulo; corollae ca. 7 mm longae roseae ? inferne tubulares valde indurata, tubis ca. 3.5 longis, faucibus perbrevibus infundibularibus intus glabris, lobis anguste oblongis ca. 1.5 mm longis et 0.5 mm latis extus plerumque glabris superne pauce perbreviter setiferis et glanduliferis, cellulis quadratis, parietibus non sinuosis; filamenta in parte superiore subfusiformia ca. 300 μ longa; thecae antherarum ca. 1 mm longae, appendicibus oblongis ca. 200 μ longis et 175 μ latis; styli inferne inflati glabri; achaenia prismatica ca. 4 mm longa superne breviter pauce setifera ceterum glabra; carpopodia breviter cylindrica, cellulis subquadratis ca. 15 μ diam. ca. 10-seriatis; setae pappi 45-50 flavescens apice vix scabrae non clavatae. Grana pollinis ca. 25 μ diam.

TYPE: COSTA RICA: Cartago: southern slopes of Volcan Irazu and Volcan Turrialba, ca. 3 kms generally NE of San Rafael de Irazu. Elevation ca. 8,300 ft., June 18, 1974, Robert Merrill King 6823 (Holotype US). Paratype same location: R.M. King 6822 (US).

The new species is one of the few having enlarged style bases but no hairs on the inner surface of the corolla. The most closely related species in Costa Rica, N. burgeri R.M. King & H. Robinson has larger more retrorse teeth on the petiole and has a long horizontal rhizome from which the erect shoots arise. The new species completely lacks any horizontal rhizome. Closest relationship is actually to N. panamensis R.M. King & H. Robinson of western Panama. The new species differs by the greater size of its heads and florets, and by the consistently winged petioles of the leaves. In N. panamensis only the leaves at the base of the inflorescence seem to have wings on the petioles. Possible distinctions needing confirmation are the

longer internodes of the thickened broadly fistulose stems and the nonglanduliferous corolla tubes.

The new species is named in honor of Gilbert Grosvenor of The National Geographic Society.

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Neomirandea biflora R.M.King & H.Robinson, Holotype,
United States National Herbarium. Photos by Victor E.
Krantz, Staff Photographer, National Museum of Natural
History.



Neomirandea croatii R.M.King & H.Robinson, Holotype,
United States National Herbarium.



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Neomirandea gracilis R.M.King & H.Robinson, Holotype,
United States National Herbarium.



Neomirandea grosvenorii R.M.King & H.Robinson,
Holotype, United States National Herbarium.



Enlargements of heads of Neomirandea. Top left; Neomirandea biflora. Top right; N. croatii. Bottom left; N. gracilis. Bottom right; N. grosvenorii.

POLYBOTRYA IN NICARAGUA

Melissa Page Marshall¹ and Frank C. Seymour²

Literature on the flora of Nicaragua is very scattered and sometimes difficult to obtain, usually to be found only in large botanical libraries. Specimens likewise are few and far between. For these reasons, it is especially desirable to publish results of studies in the flora of that country.

A good example of the scarcity of literature and specimens is a genus of Ferns, Polybotrya of the Polypodiaceae. As species not formerly known in Nicaragua are frequently found, it is advisable to include on such a study all the species known to occur in Central America. Having had occasion to study the specimens themselves in several herbaria named below, it may be helpful to pass on some of our notes. The following data we hope will make more accessible a means of identifying specimens from Nicaragua.

We wish to express our thanks to the following for the privilege of studying specimens in their herbaria and consulting their libraries. Dr. Reed C. Rollins, Director of the Gray Herbarium; Dr. Richard A. Howard, Director of the Arnold Arboretum; and Dr. Daniel B. Ward, Director of the Herbarium of the University of Florida. We express our thanks to Dr. Ward and to Dr. David B. Lellinger of the United States National Herbarium for important information.

A brief description of the genus, POLYBOTRYA Humboldt & Bonpland, following Copeland. Stem climbing. Rootstock creeping, with linear, needle-like, castaneous paleae, their margins toothed. Stipes remote, long, scaly at least at base, setose or glabrescent. Fronds pinnate to tripinnate. Fertile blade very different from the sterile blade, the segments of fertile blade being much narrower. Veins usually free but in some species joining near the margin. Sporangia covering the lower surface and sometimes found on the upper surface also.

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ARTIFICIAL KEY TO SPECIES OF POLYBOTRYA

Known to occur in Central America

1. Pinnae of sterile fronds simple, glabrous; stipe straw-colored 2.
2. Veins of sterile frond rarely branched except near costa and margin; sterile pinnae entire; pinnae of fertile frond simple or pinnate; stipe of sterile frond straw-colored, scaly near base or glabrous 1. P. cervina
2. Veins of sterile frond branched 2-4 times; sterile pinnae serrate to entire; pinnae of fertile frond pinnate to pinnatifid 3.
3. Stipes naked, straw-colored; on sterile frond, pinnae subentire; on fertile frond, longest pinnules 12-16 mm long 2. P. Kalbreyeri
3. Stipes scaly, densely so at base 4.
4. Pinnae on sterile frond serrate; on fertile frond, longest pinnules 5-6 mm long; on sterile frond, veins frequently rejoining; stipes straw-colored 3. P. serratifolia
4. Pinnae on sterile frond entire or crenate; on fertile frond, longest pinnules about 3 mm long; stipes golden-brown; on sterile frond, veins never rejoining 4. P. salicifolia
1. Pinnae (at least basal ones) pinnately compound 5.
5. Blades hairy beneath; rachis densely pubescent 6.
6. Blades finely pubescent on veinlets of lower surface, soft and fuzzy to the touch; upper surface of pinnae smooth; segments toothed 5. P. villosula
6. Blades sparingly hairy beneath, almost glabrous above; segments entire 6. P. costaricensis
5. Blades smooth on upper and lower surfaces; pubescent sometimes on rachis and midvein of pinnae, or very slightly on the midveins of pinnules 7.
7. Fronds small; sterile fronds 14 cm wide, 25-30 cm long; segments denticulate 7. P. gracilis
7. Fronds larger; sterile fronds sometimes 25-30 cm wide, 50 cm long or longer 8.
8. Pinnules cut not quite to axis, pinnatifid 9.
9. Rachis and midveins usually hairy beneath; rootstock 1-2 cm thick; segments close together, touching 8. P. osmundacea
9. Rachis glabrous; sterile fronds 25-30 cm wide, up to 50 cm long 9. P. Aucuparia
8. Pinnules cut to axis; pinnae pinnate 10.

10. Rachis very hairy, increasingly toward apex; stipe glabrous; pinnae up to 20-40 cm long; pinnules petiolate, distinct from all others 10. P. caudata
10. Rachis glabrous or slightly hairy 11.
11. Segments close together, touching, widely adherent to axis, decurrent, ovate-acute, unequal, subauriculate above 11. P. scandens
11. Segments slightly separated by a space; free space near axis of pinnules also; upper and lower surfaces of pinnae nearly or quite glabrous; segments blunt 12.
12. Segments on lower side of pinnules shorter than those on upper side, 0.8 as long, blunt . 12. P. canaliculata
12. Segments on lower side of pinnules longer than those on upper side, 1.5 as long; blade glabrous or almost glabrous 13. P. Alfredii

COMMENTS

1. POLYBOTRYA CERVINA (L.) Kaulfuss, Enum. 55. 1824. Rhizome creeping, 1-2 cm thick. Stipe with many linear brown scales; scales 1-2 cm long and only 1 mm or less wide. Sterile blades simple pinnate, oblong to oval-oblong, 40-80 mm long, 20-30 cm across. Pinnae entire, 4-12 pairs, alternate, linear to oblong-linear, 15-25 cm long, about 37 cm across, glabrous, light-green, with entire margin. Veins forking once shortly after the midvein, joined at their apices by a vein running along the margin of the pinna. Fertile fronds longer, simply pinnate or bipinnate. Spores dark-brown, densely covering both the upper and lower surfaces of the pinnae. A fern of the tropical wet zones of mountain forests, growing either terrestrially or on tree trunks. Specimens from British Honduras, Guatemala, Honduras and Costa Rica (GH, FLAS), Porto Rico, Jamaica (FLAS), Cuba (FLAS), South America.

2. POLYBOTRYA KALBREYERI C. Chr., Ind. Fil. 12. 1905. 504. 1906. Acrostichum juglandifolium Baker, Journ. Bot. 207. 1881, non Kaulfuss 1824. Polybotrya juglandifolia Christ, Bull. Herb. Boiss. II. 4:965. 1904. . P. juglandifolia Baker, Icon. Plantarum VII, Filic. III, Pl. 1691, sub Acrosticho. The following is a copy of the original description of Acrostichum juglandifolium in English by Baker, Journ. Bot. 207. 1881. "Rhizome wide-scandent. Stipe of the barren frond a foot long, naked, stramineous. Barren frond oblong-lanceolate, simply pinnate, 1 1/2-2 feet long, subcoriaceous in texture, bright green and quite naked on both surfaces. Pinnae lanceolate, upper sessile,

lower shortly petioled, 5-6 in. long, 18-21 lin. broad, acuminate, subentire, rather cut away at the base in the lower half. Veins faint; main ones continuous from the costa of the pinnae to the margin about 1/4 in. apart, erecto-patent; veinlets 3-4-jugate, very ascending, simple, the groups regularly joining about a third of the way from the midrib to the edge. Fertile fronds bipinnate. Pinnae lanceolate, 4-6 in. long, 1-1 1/4 in. broad, the lower 1/2-3/4 in. long, growing gradually smaller towards the tip of the pinnae. --On trees in the forests, 5,000 feet. " Rootstock with long dark linear scales. On fertile blades, pinnules distant, oblong, blunt, longest 12-16 mm long. Type: Costa Rica, New Granada, Kalbreyer 1798. We have seen no specimen of this species. Distribution: Costa Rica.

3. POLYBOTRYA SERRATIFOLIA (Fée) Klotzsch, *Linnaea* 20: 430. 1847. Soromanes Fée, *Achrost.* 82. 1845. Rootstock with long reddish filiform scales. Stipe scaly, densely so at base. Pinnae serrate, attenuate. Sterile frond simply pinnate: lower pinnae stalked: stalks about 2 mm long. On fertile frond, pinnae pinnate. Pinnules distant, oblong, blunt, longest 5-6 mm long. Veins anastomosing in pairs. Similar to P. cervina, but in P. cervina, sterile pinnae are entire. Distribution: Costa Rica (FLAS), Venezuela, Fendler 261 (GH).

4. POLYBOTRYA SALICIFOLIA Lellinger, *Amer. Fern Journ.* 62:54, figs. 3, 4, 10. 1972. The following description consists of excerpts from the original description. Rootstock climbing, 0.5-1(-2?) mm thick, densely scaly; scales up to 2 mm wide, 1.5 cm long, golden-brown. Stipes 25-75 cm long, straw-colored, densely scaly. Rachis pilosulous in grooves, sparsely scaly. Sterile pinnae (1)1.5-4 cm wide, (6)17-23 cm long, margin entire or crenate. Veins branching, not rejoining. Fertile pinnae 0.5-2 cm wide, up to 12 cm long. Segments 1-2 mm wide, 1-12 mm long. This description is translated from the Latin. We have seen no specimen of this species. Type: Colombia, Dept. Santander, Puerto Berrio, Haught 1757 (US). Distribution: Costa Rica, Colombia, Venezuela.

5. POLYBOTRYA VILLOSULA Christ, *Bull. Herb. Boiss.* II, 6:168. 1906. Rootstock creeping. Rachis villous. Sterile blade simply pinnate and pinnae lobed: or pinnae pinnate and pinnules lobed. Fertile segments narrower than the sterile. Like the other species of this genus, either terrestrial or climbing on tree trunks. It can be confused with no other species of Polybotrya because of the great amount of its pubescence. It is

extremely fuzzy, predominantly on the veinlets. The hairs are very short and fine. Distribution: British Honduras, Guatemala, Costa Rica, Panama (GH, FLAS). Type in Herb. Christ.

6. POLYBOTRYA COSTARICENSIS Brade, Bradea 1(1):11, tab. 1, fig. 1. 1969. Rootstock 12 mm thick. Scales of rootstock lanceolate, acute, 0.5-1.8 mm wide, 12-14 mm long. Sterile frond 80 cm long, 70 cm wide, bipinnate at base; pinnae short-stalked, 35 cm long, 16 cm wide; pinnules, sometimes basal ones, subbipinnatifid, rounded at tip, up to 8 cm long, 2.2 cm wide, lobed; lobes rounded at tip, above subglabrate, below sparsely hirsute. Rachis and midribs rather densely puberulent and very sparsely hirsute. Fertile fronds bipinnate; pinnules linear, up to 8 cm long, [1-1.5 cm wide]. Translation of excerpts from original description. We have seen no specimen of this species. Holotype: Costa Rica, regiao litoral atlantica, Finca Hundresser, coll. A. & A. C. Brade 374 (Herb. Brade).

7. POLYBOTRYA GRACILIS Brade, Bradea 1(1):14, tab. 1. fig. 3 & tab. 3. 1969. Rootstock 4 mm thick, its scales lanceolate-acuminate, 0.5-1 mm wide, up to 5 mm long. Sterile frond 25-30 cm long, 14 cm wide, bipinnate; pinnae short-petioled, the larger 7 cm long, 2 cm wide; pinnules, the lowest, up to 1.2 cm long, 0.6 cm wide, with few teeth; rachis and midvein of pinnae puberulent below. Fertile fronds 25 cm long, 10 cm wide, bipinnate-tripinnatifid; pinnae up to 5 cm long, 1.2 cm wide, pinnate-pinnatifid. . . . Translated excerpts from the original description. We have seen no specimen of this species. Holotype: Costa Rica, Tablazo, A. & A. C. Brade 554 in Herb. Brade. Distribution: Costa Rica.

8. POLYBOTRYA OSMUNDACEA H. & B. ex Willd., Sp. 5:99. 1810. Rhizome creeping, 1-2 cm thick, with stipes growing out at intervals. Scales of stipe thin, brown, very linear, generally located at the base of the stipe, but also scattered up the length of it. Blades smooth on both surfaces, pubescent sometimes on rachis, midvein of pinnae or very slightly on the midvein of pinnules. Sterile blade tripinnatifid; lower pinnules deeply lobed. Fertile blade similar but segments narrower. The most distinguishing characteristic occurs on the lower pinnae; here the lowest pair of pinnules is reduced in size; the very lowest pinnule is drastically smaller, broad-elliptic in shape. On fertile pinnules, spores appear on the outer edges, becoming denser, shivering the pinnules until there are long lines of mass-

ed spores with only knobs to indicate where the pinnules are. Climbing on tree trunks in wooded ravines. Distribution: Honduras, Nicaragua, Costa Rica and Panama. Costa Rica (FLAS). Nicaragua, Castillo, Shimek, as *Acrostichum*.

Cororia Bush, near Bilwaskarma, Atwood 3711 (VT).

9. POLYBOTRYA AUCUPARIA Christ, Bull. Herb. Boiss. II, 6:166. 1906. Similar to P. serratifolia (Fée) Klotzsch. The following is a translation of excerpts from the original description in Latin by Christ, l.c. Rhizomatous. Stipe near base with subulate brown opaque hairy scales, otherwise whole plant glabrous. Frond bipinnatifid, wide at base, oblong, caudate-acuminate, up to 50 cm long, 25-30 cm wide. Pinnae remote, the lower 7 cm distant, petioled; petioles up to 4 cm long; lower pinnae 23 cm long, 11 cm wide, ovate-acuminate, lowest pinnules reduced; lowest and middle pinnules 1-1.5 cm distant, narrowly lanceolate, somewhat or very obtuse, very slightly crenate-dentate or entire. Nerves mostly simple. We have seen no specimen of this species. Type in Herb. Christ. Distribution: Costa Rica.

10. POLYBOTRYA CAUDATA Kunze, Linnaea 9:23. 1834. Rootstock large, woody, 1m long. Stipe glabrous. Fronds up to 7 dm long. Rachis hairy, increasingly toward the apex. Both the stipe and the rachis grooved, as is the midvein of the pinnules but not the veins of the lobes. Upper surface of the pinnae glabrous; sometimes a little pubescence on the midveins of the lower surface of the pinnules. Pinnules light-green with short tapering lobes cut to the midvein. Frond leathery in texture. Stipes appearing when fresh, almost succulent. Sterile frond bipinnate. Climbing on forest tree trunks. Distribution: Costa Rica, Panama and Canal Zone.

11. POLYBOTRYA SCANDENS (Raddi) Christ, Bull. Herb. Boiss. II, 4:965. 1904. Aspidium scandens Raddi, Pl. Bras. 1: 34, t. 49. 1825. P. acuminata Kaulfuss, Link Hort. Berol. 2: 135. 1833. Rootstock with long reddish filiform scales. Sterile frond bipinnate. Pinnae divided into distinct short-stalked attenuate pinnules at base. Rachis almost glabrous. Stipe sparsely scaly above, densely so at base. Fertile frond tripinnate, its segments worm-like, linear, 1 cm long. Stipe and rachis as on sterile fronds. Pinnules of lower pinnae pinnate. Ultimate segments oblong, obtuse, 3-6 mm long. Pinnules of lower pinnae of sterile frond stalked, attenuate, coarsely serrate, largest 2.5 cm wide, 7 cm long. We have seen no specimen of this species. Distribution: Costa Rica, Brazil.

12. POLYBOTRYA CANALICULATA Klotzsch, *Linnaea* 20:429. 1847. Closely resembling the preceding in all characteristics except the degree of lobing of the pinnules; lower pinnules of most of the lower pinnae cut down to the midvein. (This occurs for nearly half of the length of the pinnule.) Segments blunt instead of tapering to a tip. Fronds 1 m long. Distribution: Panama, Venezuela. Reported in Nicaragua, Camp Menocal, Shim-ek, as Acrostichum canaliculatum (Klotzsch) Hk.
13. POLYBOTRYA ALFREDII Brade, *Bradea* 1(1):12, tab. 1, fig. 2. 1969. Rootstock 6 mm thick. Scales of rootstock lanceolate, long-acuminate, 1-1.5 mm wide, 8-14 mm long. Sterile blade on both surfaces glabrous or subglabrous, about 65 cm long, 35-40 cm wide, bipinnate-tripinnatifid; pinnae very short-stalked, up to 23 cm long, 8 cm wide; pinnules pinnatifid, lowest pinnate, acuminate at tip, up to 4 cm long, 1.8 cm wide; rachis and midveins puberulent. Fertile blades slightly smaller; pinnae 15-18 cm long; segments oblong or rounded. Translation of excerpts of original description. We have seen no specimen of this species. Holotype: Costa Rica, Tablazo, coll. A. & A. C. Brade 98 (Herb. Brade).

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MISCELLANEOUS NOTES ON NEOTROPICAL FLORA, VI.

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These notes are descriptions of new taxa in the Compositae extracted from studies for forthcoming monographs in preparation. The relationships of these new taxa will be discussed at length in the final generic revision, following similar lines of the previous contributions of this series. See PHYTOLOGIA 27: 169-179, 1973. The basic work for these notes has been partially sponsored by the National Science Foundation (grant GB-36060X), Washington, D.C.

ESPELETIA BROMELIOIDES Cuatr. sp. nov.

Caulis lignosus ad 4-5 cm diametro prostratus rhizomatosus vel erectus usque ad 40 cm longus vel decumbens, cortice valde cicatricoso, rugoso-tuberculato cum reliquis foliorum marcescentium tectus, rostrum terminalem ferens et ramulos subterminales foliatis formans. Rosulae 30-50 cm latae virides foliis copiosissimis erectis et erecto-patulis, proximalibus saepe gemmiferis, instructae.

Folia coriacea crassiuscula rigida vel flexibilia sessilia. Lamina elongate triangulata sine sensu acuminata vel ensiformi-acuminata, acuta, supra basim leviter vel obsolete attenuata, basi indistincte in vaginam brevem planam vix ampliata producta, 19-30 cm longa, infra medium usque ad 1.4-2.6 cm lata, basi usque ad 1.2-2 cm angustata, margine revoluta aspectu integerrima sed denticulis callosis crassiusculis mucroniformibus adaxiale recurvis sparsis cum indumento omnino occultis; supra viridis vel olivaceo-viridis nitida, in sicco olivacea, excepto ad costam anguste sulcatam basim versus latiore densissime crasseque adpresse villosa-sericeam (pilis tenuissimis sericeis antrorsis ad 3 mm longis) glabra, laevis nervis secundariis obsoletis interdum tantum circa basim una vel duobus venis linearibus angustissime sericeis visibilibus; subtus crasse densissime adpressissimeque villosa-sericea viridi-cinera nitida, pilis tenuissimis antrorsis circa 2 mm; nervatione obsoleta cum vestimento omnino tecta sed infra indumentum valde prominenti, costa crasse basim versus magis ampliata bisulcata costulata laterale striolata circa basim robustiori saepe argute 7-costulata, nervis secundariis minoribus 7-10 utroque latere, inferne saepe 3-4 magis notatis, subparallelis, angulo 5-10° ascendentibus parte media angulo 15°, sursum nervis gradatim minus conspicuis magis apertis (20-40°), nervulis minoribus prominentibus crassiusculis minutum reticulum elevatus formantibus, areolis valde profundis angustissimis pilis tenuissimis crispis munitis.

Vagina crassiuscula brevis levissime ampliata saepe utroque latere 4-nervata, subplana, adulta 1.5-2.5 x 1.4-2.5 (basi) cm.

Inflorescentiae terminales racemoide paniculatae vel corymboide-paniculatae erectae 55-85 cm altae 8-24 cm latae. Axis robustissimis lignosus fistulosus vel medullosus extus argute costatus striatusque parte media vulgo 1.5 cm diametro basi usque ad 4 cm diametro, plerumque purpurascens interdum pallide viridis, densiuscule vel copiose villososericeus pilis longis (3 mm) ascendentibus laxiuscule intricatis, inferne dense ceterum copiose foliosus, dimidia parte superiori tantum ramosus. Folia basilaria congesta rosularia similissima adjacentia paulo breviora vagina breviori, supra basim 2.5-1.5 x 2.2-1 cm, cetera folia sterilia sursum gradatim paulo minora 2.0-1.2 x 1.5-1.2 cm, plerumque lineari-sublanceolata acuminata basi semiamplectenti textura indumentoque basilaria similia. Rami numerosi erecti robusti recti vel arcuato-ascendentes inferiores usque ad 25 cm longi et 7 mm crassi sed vulgo angustiores, saepe sursum gradatim breviores, purpurascens interdum pallide virides, semper densiuscule villososericei, pilis albis patulo-ascendentibus 1-1.5 mm dense vestiti, tantum tertio superiori ramulosis, ramulis erectis corymboide dispositis in ramusculos divisus. Ramusculi villososericei purpurascens, interdum luteo-viduli, 1-6 capitula primum valde congeste glomerata denique conspicue pedicellata ferentes. Pedicelli antrorso-patulo-pilosi purpurei vel viriduli, ebracteati, 2-1.5 mm longi, post fructificationem vetusti robustiores 0.2-3 cm longi. Folia ramos subtendentia excedentia, triangulari-linearia acuminata circa 1.6-1.0 x 1.8-0.8 cm, suprema 4-3 x 0.8-0.3 cm, in bracteas transientia. Bracteae ramusculos pedicellosque subtendentes longiores subcoriaceae triangulari-lineares vel lineares supra glabrae subtus sericeae 3-1 x 0.5-0.15 cm.

Capitula subdiscoidea subglobosa, 7-13 mm diametentia visu atropurpurea vel atroviridia, (42-)70-125 flores ferentia. Involucrum cupulatum. Phyllaria sterilia 6-12, raro 4-2, discum attingentia interdum longiora, 1-2 seriata 9-6 x 2-1.4 mm, crassiuscula herbacea purpurascens vel atroviridia vel pallide viridia, linearia sursum attenuata subacutataque, incurva, adaxiale glabra saepe 5-venosa, abaxiale dense subadpresse villosa pilis rigidulis acutis ascendentibus 1-1.5 mm longis, interdum glandulis pediculatis interspersis ad margines conspicuis, apice calloso glabro. Phyllaria fertilia 6.5-4.5 x 2.2-1 mm linearia vel oblonga, externa sterilia similia vel dorso basique incrassata semiamplectentia, cetera deorsum angustata apice angulata ad costam incrassata marginibus membranaceis 2-3 venis utroque latere, dorso et sursum dense breviterque pilosa pilis subadpressis sursum obtusis et subclavatis 0.2-0.4 (-0.5) mm, plus margine glandulis capitato-pediculatis circa 0.05 mm longis bene conspicuis. Receptaculum convexo-conicum 5-6 (-3.4) mm diam, glabrum vel parvis pilis. Paleae 4-5 (-5.5) x 1.3-2.5 mm subscariosae cum costa

crassiori rigida, oblongae vel ovali-oblongae basim versus angustatae apice acutae vel subacutae, utroque latere 1-3-venosae, amplexantes, dorso medialis moderate sursum limbo antrorso-pilosas pilis fusco-rubris obtusis vel subclavatis 0.2-0.6 mm, et glandulis pediculatis 0.05 mm saepe copiosis.

Flores marginales feminei (21-)30-47 in capitulo 3(-2)-seriati. Corolla valde reducta, 1.2-2.5(-3) mm longa semper quam stylus brevior: tubo bene evoluto 0.6-1.5 mm longo basi incrassato apice cum tumulo interiori crassiusculo instructo, extus densa vel copiose pilosa pilis hyalinis crassiusculis obtusis vel subclavatis vel clavatis interius subacutis 0.2-0.3(-0.6) mm, petulis vel ascendentibus et glandulis capitato-pediculatis interspersis munito, apice abaxiale saepe minuto dente obtuso vel emarginato vel raro lineari elongato; lamina minima lutea vel luteo-viridi, 0.5-1(-1.5) mm longa, elliptica vel lingulata 0.2-0.5 mm lata, minute 2-3-dentata vel edentata, vel in 2,3 (raro 4) lobulos vel lacinulas minutas aequilongas vel inaequales partita vel ad dentem minutum seu inconspicuum reducta, abaxiale plus minusve pilosula. Stylus 2.5-4 mm longus purpureus, ramulus crassiusculus 0.6-1 mm. Ovaria oblonga triquetra apice obtusa basim angustata acuteque. Achaenia exteriora obovato-oblonga triangulata basi acutissima dorso subplano vel convexo, arcuata, 2.1-2.8 x 1.1-1.3 mm, interiora 2.3-3 x 0.6-1 mm, magis oblonga laterale compressa dorso protruda vel quadrangulata.

Flores disci pseudohermaphroditi (21-)40-75 in capitulo. Corolla luteola 4.5-5.5 mm longa, tubulo 1.8-2.5(-3) mm, glabro (raro parcissimis pilis), limbo campanulato-tubuloso, sursum infra lobos sparsis pilis et glandulis, lobis 0.7-1 mm longis inaequalibus, oblongo-triangularibus acutis marginibus incrassatis et papillosis, abaxiale sursum densiuscule pilosis pilis antrorsis rubro-fuscis subclavatis et clavatis vel subobtusis 0.15-0.3(-0.4) mm deorsum sparsis vel copiosis glandulis obovatis subsessilibus, apice calloso nudo. Antherae 1.7-2 mm, appendice ovata subacuta 0.4-0.45 mm longa. Stylus 4.5-6 mm. Nectarium tubulosum 1-1.3 mm longum profunde 5-dentatum.

Typus: Venezuela, Mérida: Páramo de Las Coloradas, Potreroc de San Rafael, 2600-2700 m, inflorescencia con eje central, lígulas amarillas, 18-20 Jun 1974, M. López-Figueiras & H. Rodríguez 9054; holotypus, US; isotypus, MERF. Ibidem planta acaule hasta 70 cm altura total, inflorescencia central, 18-20 Jun 1974, López-Figueiras & H. Rodríguez 9044 (US, MERF, paratypi). Ibidem, inflorescencia central 30-50 cm, eje purpúreo, lígulas amarillas, estilo purpúreo, flores del centro cremoso-amarillentas, 18-20 Jun 1974, López-Figueiras & H. Rodríguez 9042 (US, MERF, paratypi). Ibidem, inflorescencia central en fructificación avanzada, 9 Jan 1974, López-Figueiras, H. Rodríguez & A. Carabot 8955 (US, MERF). Ibidem, 2850 m, rosetas verdes semibrillantes o mates, gregarias por ramificación basilar, hoja blanco-cinéreo-seríceo o argentada envés, 9 Febr 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28533 (US, MERF). Id. El Portachuelo (El Ramal), 2800 m, acaulirrosuleto 40 cm alto, estéril, 4 Ag 1970, Ruiz-Terán & López-Figueiras 409 (US, MERF). Ibidem, tronco hasta 40 cm, cubierto de residuos de

hoja marcescente, hojas verde pálidas, brillantes haz, verdoso cinéreas envés, inflorescencia central muy joven, con capullos, lígulas incipientes amarillas o algo verdósulas, estilos amarillos, flósculos amarillo claros. 8 Febr 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28503 (US, MERF).

ESPELETIA COLORADARUM Cuatr. sp. nov.

Caulirosula ad 2.5 m alta. Caulis lignosus erectus sursum medulosus deorsum fistulosus, basi 5 cm diam, apice subtruncato-rotundato 3 cm diametro, subapicem dense foliatus internodiis densissime sericeo-barbatus pilis strictis antrorsis 6 mm longis inter folias adpressis, infra rosulam foliis marcescentibus pendulis copiosis et vaginis foliorum emortuorum remanentibus adpressis obsitus, deorsum denique denudatus cortice ochroleuca crebre cicatricoso-striata internodiis subsemicircularibus 1-4 mm longis. Rosulae comosae dense foliatae visu albescenti-cinereae. Gemma terminalis et folia initialia adjacentia revoluta dense longeque albo-villoso-sericea.

Folia coriacea rigida subsessilia. Lamina anguste oblanceolato-linearis vel sublanceolato-linearis vel linearis apice acuminata valde acuta inferne gradatim usque ad basim in brevem pseudopetiolum anguste alatum raro exalatum angustata, infra basim subite in vaginam planam amplectentem ampliata, margine revoluta visu integra sed dentibus mucroniformibus crassiusculis callosis ad 0.5 mm, abaxiale recurvatis leviter conspicuis, 24-41 cm longa, 2-6 cm lata; supra juvenilis dense nitideque longe sericea deinde glabrata costa lanuginosa excepta, denique excepto ad basim lanuginosa omnino glabra, pallide viridis vel luteolo-viridis costa plana vel sursum leviter sulcata deorsum paulo prominenti; subtus dense crasseque lanata albo-cinerea vel albo-ochraceo-virescens, costa prominenti robusta striolata deorsum bisulcata primum dense villosa-sericea deinde glabrata sed inferne persistente longe villosa-gossypina, nervis secundariis valde prominentibus, angulo (60-)65-75°(-80°) ascendentibus, parallelis 2-5(-6) mm inter se distantibus, vulgo 3-4(2-5) in 1 cm, cum crasso indumento occultis sed praecipue denique plus minusve signatis, nervis tertiis et minoribus etiam prominentibus reticulatum densum elevatum formantibus areolis profundis cum lanicula repletis. Basi lamina circa basim valde angustata pseudopetiolum alatum formantibus (5-20 mm longum) interdum brevissime (5 mm) ad costam reductum, semper dense longeque villosa-gossypinum. Vagina coriacea semiovata vel subsemiorbicularis vel oblongo-ovata (in juvenilis angustior), 3-2.5(3.5-4) cm longa (6-)5-3 cm lata, argute multi (34-50)-nervata, intus glabra, extus dense adpresseque albo-sericeo-barbata pilis ad 10 mm longis.

Inflorescentia terminalis corymbiforme paniculata valde floribunda usque ad 48 cm alta 40 cm expansa folia rosularum attingens vel paulo excedens. Axis lignosus, basi 2 cm diam, robustus angulatus a basi foliatus et conferte ramosus. Rami principales 16-18, lignosi robusti rigidi ascendentes; inferiores patulo ascendentes longiores verticem attingentes 50-40 cm longi,

inferne (4-) 10-20 cm longitudine nudi, circa $2/3$ vel $1/2$ et cum uno duobus paribus foliis oppositis vel plerumque alternis, oblongis acute acuminatis 17-9 x 2-1.8 cm sursum decreascentibus internodiis longioribus vel brevioribus laceratis in amentis vel foliis similibus, ramulis 5-7 plerumque alternis erectis vel ascendentibus in parcos ramusculos 3-8 capitula plus minusve glomerata ferentes divisus; alteri rami basiliares similes sed sursum in totum gradatim breviores, ultimi juxta verticem 10-8 cm longi axem excedentes. Axis, rami ramulique omnes epidermide purpurascens sed dense longeque villosogossypini, albicanti, pilis albis sericeis ascendentibus inferne 5 mm, sursum 3 mm longis deinde flexuosis intricatisque crassiuscule molleque tacti. Folia ramorum primariarum aut adnatis ramulorum similia sunt sed breviora, proximalia 36-27 x 3.4-2.5 cm, cetera sursum gradatim minoribus sed semper parvis individuis notum bene suprantia, et vaginis amplectentibus. Folia ramulos subtendentia etiam cetera folia similia rigida et sursum gradatim breviora (14-8 x 2-1.2 cm) cum vaginis ovatis amplectenti saepe purpureo diluteque gossypina, suprema magis acuminata acutissima ad 3-2.5 x 0.7-0.3 cm reducta et in bracteas transientes. Pedicelli 2-7 mm longi primum brevissimi capitulis congeste glomeratis maturitate elongati usque ad 15 mm longi, dense villosolantati. Bracteae rigidae ovato-acuminatae acutae convexo-amplectentes plurinerviae intus glabrae acumine excepto extus lanugineae.

Capitula radiata ligulis amotis depresso subglobosa 8-10 mm lata, 66-102 flores ferentia, circulo ligularum 11-16 mm disco 7-10 mm diametro. Involucrum cupulatum leviter albido-lanuginosum. Phyllaria sterilia 5-8, crasse herbacea, capitulum haud excedentia 7-5 x 4-3 mm, ovata acuminata apice acuta saepe apiculata subplana, intus glabra obsolete 3-5-nervata extus albido longe villosolanguinosa pilis strictis antrorsis vel intricatis 1.5-2 mm longis et glandulis interspersis gloroso-obovoidibus ad margines plus minusve conspicuis. Phyllaria fertilia 5.5-4 x 3-2.3 mm ovato-acuminata vel ovato-ovalia sive ovato-oblonga acuminataque basin plusminusve angustata, incurvata vel concava, subamplectentia, intus obsolete plurinervosa, extus dorso longe ascendente villosa pilis strictis 1-2 mm longis sursum brevioribus subapicem aliquis pilis obtusis vel subclavatis saepe intermixtis, apice acuto nudo, glandulis obovoidibus subsessilibus interspersis praecipue sursum ad margines et dorso saepe copiosis conspicisque. Receptaculum convexo-conicum glabrum vel sparsissimis minutis pilis obsitum. Paleae 4-5 x 1.1-1.5 mm ovali-oblongae vel obovato-ovales apice acutatae saepe callone-apiculatae membranaceae marginibus late scarioris amplectentes subcucullatae dorso sursum breviter copiosaeque antrorso-pilosis pilis subclavatis vel clavatis brunescentibus vel rubescentibus 0.1-0.2(-0.3) mm et glandulis sessilibus vel subsessilibus globoso-obovoidibus, sparsis vel copiosis sursum munitae.

Flores marginales feminei ligulati 2-3-seriati, 16-32 in capitulo. Corolla alba 4-7.3 mm longa, tubo 0.7-1.2 mm, dense piloso pilis hyalinis patulis vel ascendentibus rectis vel subflexuosis crasse subclavatis et clavatis 0.2-0.6 mm, et parvis

glandulis interspersis obovatis subsessilibus vel breviter pediculatis, fere inconspicuis, apice tubi saepe 1-2 appendicibus linearibus ad 1.5 mm longis adaxiale praedito; lamina elliptica vel oblonga 1.5-2.2 mm lata, saepe 3-2-dentata, 5-9-nervata adaxiale glabra abaxiale inferne sparse pilosa et glandulosa reliqua glabra. Stylus 2.5-3.5 mm longus ramis crasse subulatis 1-1.5 mm longis. Achaenia nigricantia, exteriora 2.2-2.3 x 1.5 mm obovoideo-triangularia basi acuta, interiora 2.5 x 1 mm magis oblonga laterale compressa subquadrangulata interdum quadrangulata.

Flores disci pseudohermaphroditi 47-73 in capitulo. Corolla lutescens 3.8-4.8 mm, tubo 1.5-1.8 mm crassiusculo, copiose vel sparse piloso pilis hyalinis ascendentibus substrictis vel crassiusculis subclavatis 0.1-0.3(-0.4) mm, et sparsissimis glandulis obovoideis subsessilibus, limbo tubuloso-infundibuliformi subglabro basi parvis pilis, lobis oblongo-triangularibus 0.8-1.2 mm, saepe inaequilongis margine incrassato adaxiale dense papilloso, dorso parvis vel copiosis glandulis obovoideis subsessilibus, et parvis pilis clavatis minutis 0.1-0.2 mm vel nullis. Antherae sagittatae 1.7-1.8 mm appendice circa 0.35 mm ovata. Nectarium 0.6-0.8 mm tubulosum breviter denticulatum.

Typus: Venezuela, Mérida: Potreros de San Rafael en Páramo de Las Coloradas, 2700 m alt, arbolito no ramificado 2.8-3 m, hojas terminales, inflorescencia central, lígulas blancas, 3 Jul 1974, M. López-Figueiras & M. Keogh 9108; holotypus, US; isotypus, MERF. Ibidem, caule 0.7-1 m, lígulas blancas 18-20 Jun 1974, López-Figueiras & H. Rodríguez 9046, 9047 (paratypi, US, MERF). Ibidem 2850-2950 m, tronco simple 1.5 m alt., 4.2 cm diam. base, rósula porte cinéreo, hoja verdoso-amarillenta mate haz, blanco-cinerea envés cogollo verdoso-blanquecino sericeo, meristemo terminal redondeado-truncado 2 cm diam., estéril, 9 Febr 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28531 (US, MERF). Loma de La Libertad junto a El Portachuelo (El Ramal) 2850 m, caulirrósula, tallo 1 m, hoja coriácea verde clara haz, blanco cinerea envés, estéril, 8 Febr 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28512A (US, MERF). Ibidem, La Montaña, 2850-2900 m, caulirrosuleto 2.5 m, estéril, 5 Aug 1970, Ruiz-Terán & López-Figueiras 493 (US, MERF).

ESPELETIA JOSEPHENSIS Cuatr. sp. nov.

Caulirosula usque ad 2.5 m alta. Caulis erectus lignosus ad basim 5 cm diametro apice congeste rosulato-foliosus et sericeo-barbatus, rosula 60-80 cm lata, habitu viridi-cinerea, infra rosulam foliis marcescentibus pendulis copiosissimis et cum vaginis foliorum remanentibus adpresse tectus, interdum denique deorsum exfoliatus et trunco visibili, cortice glabrato pallide griseo cicatricibus transversis inaequalibus 4-8 mm distantibus instructo. Gemmae foliaque initialia breviter revoluta dense villosa-sericea albo virescentia.

Folia coriacea rigida sessilia vel subsessilia. Lamina oblanceolata sursum gradatim attenuata, acuta deorsum longior gradatim angustata, interdum ad basim breviter pseudopetiolata,

basi subite in vaginam planam amplexentem ampliata, margine revoluta in adultis leviter undulata, obsolete dentata lentibus cellulis mucroniformibus 0.5 mm apicalia recurvis paulo scapulis, 30-50 cm longa 4.5-7.5 cm lata, basi usque ad 1.2-0.9(-0.7) cm latam angustata, vero sessilis vel interdum breviter ad costam reducta 1-6 cm longe pseudopetiolata: supra griseo-viridis primum pubescens vel puberula pilis albis rectis vel curvis subadpressis tecta ad costam dense adpresseque pubescenti-sericea pilis antrorsis rectis acutis 2 mm, denique glabrata rugulosa costa paulo impressa conspicua nervis secundariis filiformibus leviter impressis discolore signatis, reticulo minutissimo inter rugulositates instructo; subtus pallide viridi-cinerea juvenilis lentissima deinde molle lanata, sed costa adpresse villosa-sericea pilis tenuioribus rectis antrorsis circa 3 mm, denique deciduis denudata, costa crassa elevata striolata utroque latere angulato-sulcata, circa basin gradatim ampliata magis robusta et argutior striata, nervis secundariis bene prominentibus subregulari parallelis (3-4(-5) mm inter se distantibus (2 in 1 cm), angulo 65°-60-70°) ascendentibus, nervis tertiis cum quaterniis in reticulum polygonale prominentem minutum anastomosatis, venulis reticulum prominulum minutissimum inferne instructis, areolis intrareticularibus minute lana crispa alba praeditis. Pseudopetiolus 0-2.5 cm longus, angustissime vel haud alatus. Vagina coriacea subsemi-orbiculari multinervata apice rotundata basi leviter arcuata, adaxiale tantum infra apicem dense villosa-lanuginosa reliqua glaberrima, abaxiale dense longeque villosa-subsericeo-barbata pilis strictissimis sericeis antrorsis 10 mm longis inter vaginas compressis.

Inflorescencia terminalis magna corymbiforme paniculata suboconica valde floribunda circa 40 cm alta 90 cm diametens folia rosularia paulo longior. Axis lignosus valde robustus basi 2.5 cm crassus, tricostato-sulcatus striatusque a basi foliosus et ramosus. Rami principales 18-20 etiam lignosi robusti rigidi patulo-ascendentes, supremi erecti; inferiores longiores verticem attingentes usque ad 75 cm longi, basim 10 cm longitudinem nudi, supra 5-6 foliis sterilibus alternis vel duobus oppositis (internodiis 8-10 cm longis) sublanceolato-oblongis acuminatis acutis internodia semper valde excedentibus, 24-9 x 4.5-1.8 cm sursum decrescentibus, textura et indumento ceteris foliis similibus, ramulis 5-7 plerumque alternis interdum oppositis erectis vel ascendentibus in aliquos ramusculos 1-9 capitula plus minusve glomerata ferentes divisis: alteri rami basilares similes sed sursum in totum gradatim breviores, ultimi juxta verticem 10-7 cm longi axem superantes. Axis rami ramuli ramusculique omnes striati epidermide plus minusve purpurascenti et laxiuscule longeque villosa-gossypini, pilis sericeis ascendentibus inferne ad 5 mm longis albidis vel ochroleucis sursum brevioribus deinde flexuosis intricatisque indumentum lanugineum laxum ad ramulos ferantibus. Folia ramos primarios subtendentia rosularia similia sed breviora, proximalia 33-26 x 5-4.5 cm, cetera sursum gradatim minora sed semper partem

indivisam ramorum superantia, vaginis amplexentibus. Folia ramulos subtendentia etiam cetera folia similia, sed sursum gradatim minora (12-4.5 x 2.7-0.7 cm) et indumento breviori, cum vagina evoluta amplexenti viridi intus glabra extus albo-lanuginea, suprema magis acuminata acutissima in bracteas transientia. Pedicelli primum brevissimi deinde evoluti 3-10 mm longi, copiose longeque villosi-lanuginosi, pilis ad 3 mm longis patulo-flexuosis plerumque intricatis ochraceis (in sicco). Bracteae 10-15 x 4.5-5 mm, amplexentes, ovato-acuminatae plurinervatae extus praecipue deorsum sparse villosae margine ciliatae ciliis 1-1.5 mm.

Capitulata radiata ligulis amotis semiglobosa vel depresso subglobosa 10-12 mm lata, 78-124 flores ferentia, circulo ligularum 18-20 mm disco 9-10 mm diametro. Involucrum cupulatum viride, dilute villosi-hirsutum. Phyllaria sterilia 7-8 crasse herbacea ovato-acuminata acuta, 9-6 x 5-3.5 mm, 5-7-nervata, extus praecipue deorsum marginibusque dilute villosula pilis subpatulis tenuibus acutis 1-1.5 mm interdum sursum aliquis obtusis brevioribus et dorso margineque glandulis crasse pediculato-capitatis brevibus 0.03-0.05 mm longis copiosis praedita. Phyllaria fertilia 5.5-4.5 x 4-2(-1.5) mm, exteriora quam sterilia similia interiora gradatim angustiora tenuiora, amplexentia oblonga apice angulata acutaeque deorsum angustata obsolete plurivenosa, dorso pilis sparsis 0.5-1 mm, sursum copiose pilosa pilis erectis obtusis et subclavatis rubrofuscis 0.6-0.2 mm longis et glandulis copiosis pediculatis vel subsessilibus munita. Receptaculum convexo-conicum glabrum 4-6 mm diametro. Paleae 4.5-5 x 1.5 mm scariosae amplexentes oblongo-ovales apice angustato triangulato subcucullato, rubri-fusco-piloso pilis clavatis 0.2-0.3(-0.4) mm antrorsis erectisque, parvis pilis tenuioribus interspersis et copiosis glandulis crasse obovoideis subsessilibus vel breviter pediculatis (ad 0.05 mm longis) obsitae.

Flores marginales feminei ligulati 2(-3)-seriati, 22-30 in capitulo. Corolla lutea 6.5-7.8 mm longa, tubo 0.7-1 mm, copiose piloso pilis crassiusculis hyalinis patulis rectis vel flexuosis subclavatis et clavatis 0.4-0.8 mm, et glandulis capitatis breviter pediculatis 0.03-0.05 mm longis interspersis. Lamina latiuscule oblonga vel leviter subobovato-oblonga apice obtusa breviter 2-3-dentata, 2-2.6 mm lata basim paulo attenuata basi adaxiale aperta, 5-6-nervata, adaxiale minute mamillato-papillosa abaxiale supra basim parce pilosa glandulosaque sursum glabra vel sparsissimis glandulis. Stylus 3 mm longus ramis crasse subulatis 1.5-1.8 mm. Ovaria obovoideo-oblonga basi acuta exteriora triangulata 2.5 x 1.1 mm, interiora laterale compressa magis oblonga subrhomboideo-quadrangulata 2.6-2.8 x 0.7 mm. Achaenia immatura.

Flores disci pseudohermaphroditi 54-94 in capitulo. Corolla luteola 6-6.5 mm longa, tubulo angusto 2.5-2.8 mm longo sparsis pilis hyalinis subclavatis subpatulis 0.2-0.4 mm et sparsis glandulis brevibus crassiusculis capitato pediculatis; limbo infundibuliformi subglabro, lobis oblongo-triangularibus acutis 1 mm longis margine incrassato papillosoque, abaxiale copiosis

glandulis crassiusculis obovoideis subsessilibus et parvis vel raris (vel nullis) pilis clavatis fusco-rubris 0.1-0.2 mm. Antherae 2.2 mm longae sagittatae appendice ovata acutata 0.45 mm longa. Stylus 5-6 mm. Nectarium tubulosum 0.7 mm altum apice irregulariter denticulatum.

Typus: Venezuela, Mérida: Páramo de San José de Acequias arriba de Veguilla, 2600 m alt, arbolito 2-2.5 m, hojas jóvenes verdosas haz, blanco lanosas envés, inflorescencias con eje central, lígulas amarillas, 18-20 Jul 1974, M. López-Figueiras & H. Rodríguez 9073; holotypus, US; isotypus, MERF. Páramo de San José, El Cupís, 3100 m, caulirrósula, tronco 60 cm, hoja coriácea verde brillante haz, verde - canchenta envés, árbol, 1 Feb 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28449 (US, MERF).

EPELETIA LEUCACTINA Cuatr. sp. nov.

Caulirosula sessilis, vel subsessilis. Caulis ad 30 cm longus 5 cm diametro ad apicem truncato-rotundatum foliis copiosissimis erectis et patulo-erectis rosulam magnam visu viridi-albam permanentibus, internodiis dense albo-sericeis pilis sericeis antrorsis ad 10 mm longis inter vaginas foliorum adpressis. Gemma centralis et folia rosularum juvenilia adjacentia, longe angustaque linearia acuta valde margini-revoluta, dense adpresseque albo-sericea argentata nitidaque.

Folia coriacea rigida sessilia. Lamina elongata, anguste oblanceolato-linearis, apicem versus angustata acuta, basim versus sensim sine sensu attenuata basi gradatim ampliata et in vaginam dilatatam producta, 32-50 cm longa 1.9-3.2 cm lata, inferne supra basin usque ad 1.0-1 cm latam angustata, margine bene revoluta visu integerrima sed dentibus minutis callosis mucroniformibus inter se saepe 2-4 mm distantibus abaxiale recurvis cum vestimento occultis; supra viridi-cinerea sericea pilis tenuibus antrorsis adpressis densis 0.5-1.5 mm longis vel longioribus, tantum costa conspicua sursum angustissima deorsum gradatim crassiori inferne dilatata robusta striata elevata, densissime longaque argentato-sericea pilis 2-5 mm longis: subtus alba vel viridi-alba longe villosa-lanuginosa pilis 3-6 mm longis sericeis ascendentibus plus minuse curvatis vel intricatis, costa incrassata elevataque infra vestimentum dense sericeum plano-convexa striataque, bilaterale sulcata, inferne gradatim valde ampliata et striis magis numerosis robustisque, nervis secundariis crassiusculis 1.5-3(-4) mm inter se distantibus 3-4 nervis in 1 cm angulo 70-80° divergentibus (interdum 65-90°), cum nerviis tertiis etiam crassiusculis paulo minoribus et nervulis in reticulum elevatum minutum anastomozantibus, alveolis intrareticularibus valde profundis albo crispo-lanatis. Vagina coriacea vel subcoriacea ovata-oblonga vel interdum trapezoido-triangulata, apice attenuata deorsum leviter ampliata vel, interdum, in valde adulta basi maxime dilatata, triangulata, 4-5 cm longa, basi 3-7 cm lata argute multi-(20-30-)nervata, abaxiale circa apicem adpresso sericea excepta glabra, abaxiale

longe adpressequ sericeo-barbata pilis ad 10 mm longis dense tecta.

Inflorescentiae axillares racemiformi-paniculatae, elongatae, foliosissimae. Axis robustus ad 70 cm (-90) longus basi 2.5 cm crassus, argute striatus, primum dense albo-sericeo-barbatus pilis usque ad 10 mm longis, deinde magis intricatis indumento gossypino, ramificatione tantum $1/4$ superiori, parte integra a basi usque partem floriferam copiose foliosus, foliis valde elongatis linearibus amplexante vaginatis quam rosularibus similissimis, basilaribus 42-40 x 2.2-2 cm, usque ad sursum 23-20 x 1.7-1.5 cm gradatim decrescentibus, vaginis elongatis adpresse amplexantibus, parte ramosa foliis subtendentibus cum ceteris similibus sed gradatim brevioribus. Rami alterni dense lanati, in specimine adhuc juveniles non bene evoluti inferiores quam folia valde breviores, superiores folia attingentia supremi bene excedentes, plerumque 2-6 capitula pedicellata ferentes. Pedicelli 10-15 mm longi. Bracteae subtendentes lanceolato-subulatae inferne amplexantes membranaceae plurinervatae, intus glabrae extremo excepto extus copiose longeque villosa-barbatae. Rami ramusculi pedicellique dense crasseque albo-lanati.

Capitula radiata ligulis amotis depresso semiglobosa 15-16 mm lata, circulo ligularum 22-24 mm disco convexo 11-12 mm diametro, 170-220 flores ferentia. Involucrum turbinato-cupulare 15-16 mm diametro 7 mm altum, herbaceum, dense longe subsericeo-villosum fulvescenti-albidum. Phyllaria sterilia 8-9 sublanceolato-subulata acutaeque 13-10 x 3-2.5 mm, exteriora discum excedentia sed radios haud superantia, plana, supra acumine excepto glabra 5-7 nervis conspicuis, infra densissime antrorso-villosa subsericea pilis basi bulboso-ampliatis ceterum tenuissimis usque ad 8 mm longis, et glandulis columnaribus ad 0.07 mm interspersis. Phyllaria fertilia 9-6 x 3-2 mm sublanceolato-subulata acuta praecipue 5-nervata, extus dense longeque sericeo-villosa exteriora pilis dorso usque 6 mm longis altera pilis 3-1 mm, et glandulis 0.02-0.05 mm longis patulis praedita, interiora scariosa magis oblonga 4.5-5 x 1.2-1.4 mm, 3-nervata valde amplexentia extremo villosa vel hirta-barbulata et ciliata pilis circa 1 mm longis plus pilis brevioribus crassiusculis obtusis 0.2 mm longis, dorso etiam glandulis columnaribus plus minusve copiosis. Receptaculum conicum 5.5-7 mm diametro glabrum. Paleae 4.5-5 x 1.2-1.7 mm, scariosae, hyalinae, oblongae vel ovali-oblongae apice acutissimae, amplexentes costa conspicua nervis lateralibus 1-2 fere obsoletis, superne dorso margineque hirsutae ciliataeque pilis rigidis patulo-erectis subobtusis vel obtusis, interdum subclavatis, 0.2-0.8(-1) mm longis et parvis glandulis inconspicuis.

Flores marginales feminei ligulati 3-seriati, 55-66 in capitulo. Corolla alba, 8-10 mm longa, tubo 1.5-1.8 mm longo crassiusculo, copiose patulo-piloso, pilis mediocribus sed basi bulbiforme incrassatis obtusis vel subobtusis rigidulis paulo curvatis vel fere rectis 0.1-0.4(-0.5) mm longis plus glandulis columnaribus patulis robustis 0.02-0.07 mm longis copiose interspersis; apice tubo saepe dente adaxiale minutissimo; lamina 1.8-2.5 mm lata, oblonga basim versum leviter attenuata basi

aperta, apice paulo attenuata breviter 3-5-dentata, 7(-7)-nervata, axiale mamillato-papillata, axiale basi pilosula plus glandulifera cetero sursum sparsa glandulis cristiformis 0.6-0.6 mm conspicuis. Stylus 3-3.3 mm, ramis 1-1.2 mm longis. Ovaria juvenilia 3 mm, basi acuta triangularibus dorso gibbosis basi acuta, interiora laterale compressa.

Florae disci pseudomorphocauliti 110-150 in capitula. Corolla lutescens 4.2-4.5 mm longa, tubo 1.2-1.5 mm longo crassiusculo copiosis glandulis columnaribus recurvis patulis 0.6-0.6 mm longis et parvis vel parvisculis vel havi pilis hyalinis obtusis inferne incrassatis 0.1-0.3 mm, limbo tubuloso subglabro tantum basi raris pilis, lobis triangularibus acutis 0.8-1 mm longis margine valde incrassato et axiale dense papilloso, maturitate recurvatis axiale parvis pilis patulis obtusis 0.1-0.3 mm et parvis glandulis brevibus. Antherae 1.5 mm, sagittatas appendice ovata acutaeque. Stylus 4-5 mm apice elongato-conico bilobato dense breviterque papilloso. Nectarium crassum tubulosum 0.5 mm longum edentatum.

Typus: Venezuela, Táchira: Páramo del Batallón, 3000 m alt, planta acaule, ejes inflorescenciales robustos, lígulas blancas, en lugares protegidos, siempre cañales, 13 Ag 1974, M. López-Figueiras 9151; holotypus US, isotypus MERF. Ibidem, tallo 30 cm long, inflorescencias axilares en botón, López-Figueiras 9152, 9153. Ibidem in la brida Ferruginosa entre material andino 3500 m alt, rosetas grandes séviles estériles, hojas con indumento apretado semisericeo, 22 Jan 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28408 (US, MERF).

ESPELETIA RODRIGUEZII Cuatr. sp. nov.

Arbustula ad 3 m alta saepe sursum parce ramosa ramis extremo copiose camoso-foliosis. Caulis sursum ramisque teretes striolati nodosi internodiis 1.5-2 cm longis densissime crasseque adpresse barbatis pilis tenuissimis sericeis antrorsis 5-6 mm longis inter vaginas annulares et caulem valde compressis. Vaginae remanentes subcoriaceae, vulgo axiale 25 mm adaxiale 12 mm altae. Gemmae terminales et folia initialia dense crasse adpresseque submentoso-villosa subvelutina subsericea viridi-albicantia. Rosulae foliorum latae laxae visu virides.

Folia amplia viridia coriacea petiolata. Lamina oblonga vel elliptico-oblonga utrinque attenuata, oblongo-lanceolata vel oblongo-obtuseolata, apice acuta basi cuneata, irregulariter leviterque undulata margine revoluta visu integra sed adaxiale dentibus callosis mucroniformibus usque ad 0.5 mm longis reflexis 3-10 mm inter se distantibus cum indumentum cancellatis plus minusve conspicuis, 30-60 cm longa 7-13(-17) cm lata; supra juvenilis dense adpresse vel subadpresse villosa pilis tenuibus subrecitis acutis antrorsis ad 1 mm longis, ad costam albedo-vestitum densissimis 2(-2.5) mm longis, adulta rugulosa venulis impressis, puberula sed costa et nervis principalibus conspicuis impressis et minute tomentellis; subtus pallide griseo-viridula densissime villosa-subvelutina, costa robusta elevata subcarinata argute

striata, nervis secundariis robustis (0.8-)1-2 cm inter se irregulariter distantibus, angulo 60-70°(50-80) ascendentibus circa marginem arcuatis anastomosantibus, nervis tertiis et minoribus bene prominentibus reticulum minutum elevatum cum indumento velatum formantibus, pilis 1-2.5 mm longis patulo-ascendentibus parallelis densissimis indumentum molle aspectu tactoque velutino tectis, sed areolis intra reticulum pilis teneribus crispis albis instructis; lamina vetusta cum reticulo venulorum elevato bene conspicuo indumento depauperato sed semper densiuscule breviterque vestimento lanuginoso tecto. Petiolus robustus 2-4.5 cm longus, supra leviter sulcatus subtus subcarinatus striatus dense tomentosus, basi triangulatus in vaginam productus. Vagina subcoriacea rigida annularis 1-2 cm alta adaxiale usque ad 0.5 cm brevior, multivenosa extus dense longeque villosa-sericea, margine insuper plusminusve lanuginosa.

Inflorescentiae axillares corymboide paniculatae folia plus minusve aequilongae, 30-40 cm longae 10-25 cm expansae. Axis inferne robustus, striatus circa basim angulatus superficie saepe purpurascens sed insuper primum dense albido-villosus pilis subadpressis vel patulo-ascendentibus circa basim usque ad 6 mm longis ceteris sursum brevioribus, 2 mm longis, saepe deinde indumentum partim deciduum tantum pubescens, plerumque supra medium ramosus, sursum ramosissimus; parte inferiori integra plerumque duobus paribus foliis decussatis munita internodiis: primo 1-13 cm, secundo 1-10 cm, tertio 1.5-9 cm longo, foliis structura caulinariis similima sed brevioribus lamina late oblanceolata-oblonga acuta basi cuneata, inferioribus 14-26 x 4-5.5 cm, mediis 12-20 x 3-5.3 cm, petiolo 1.5-3 cm longo basi robusta triangulata in vaginam producta, vaginis decussato-connatis in annulo usque ad 1 cm alto instructo ramum cingenti. Prima divisione ramis plerumque oppositis vel suboppositis ceteris alternis. Rami ramulique rigidi striati ascendentes primum densiuscule deinde dilute sed copiose villosi vel hirtuli, pilis (3-2 mm) ochraceis acutis subrectis vel leviter flexuosis saepe caudatis subpatulis vel patulo ascendentibus vel paulo intricatis. Rami primarii tantum sursum ramosi, parte integra longa etiam 1-2 paribus foliis oppositis cum alteris similibus sed minoribus muniti; foliis subtendentibus cum sterilibus similibus sed sursum supra tertia ramificatione brevissimis in bracteas transientibus. Bracteae 1.5-5 x 3-1.5(-1) mm, inferne late sublanceolatae acutae sessiles semiamplectentes, sursum gradatim breviores angustioresque, extus dense ochraceo-antrorso-villosae. Pedicelli 1.5-5 cm longi, teneri erecti ebracteolati dilute vel copiose hirtuli, pilis patulo-ascendentibus tenuibus leviter flexuosis ad 2 mm longis, capitula singula parva erecta vel nutantia ferentes.

Capitula parva, radiata 52-80 flores ferentia, ligulis amotis 7-10 mm diametentia, subglobosa, circulo ligularum 17-22, disco convexo 7-10 mm diametro. Involucrum cupulatum viride sed ferrugineo-pubescente, circa 3 mm altum. Phyllaria sterilia saepe 5, interdum 1-2 additionalia interiora, 3.5-4.5 x 2-3.2 mm,

herbaceo-subcoriacea rigidula, ovata subiteque acutata vel ovato-acuminata, plus minusve calloso-apiculata, basi rotundata, conspicue plurivenosa, concava incurva, intus glabra nitidaque, extus dense vel dilute subadpresse villosa-pubescentis et ciliata pilis medioeribus acutis vel subacutis ad 1 mm longis, et glandulis capitato-pediculatis vel 0.03 mm longis vel subsessilibus interspersis. Phyllaria fertilia 4.5-4 x 2.5-1.8 mm subcoriacea ovato-acuminata vel oblongo-obovato-acuminata apice angulato et calloso-apiculato acutoque, basin versus angustata et magis amplectentia, plurivenosa, basi excepta dorso pubescenti marginibus ciliatis pilis antrorsis monadrysiis truncato-fusca acutis vel obtusis ad 0.5 mm longis, interiora breviora ad 3.5 x 1.8-2 mm subcoriacea ovali-oblonga apice angulato acuto amplectentia dorso costa carinata-elevata sursum antirorsum pilosa pilis acutis et obtusis vel subclavatis 0.2-0.4 mm, plus glandulis crassiusculis interspersis ad margines conspicuis 0.03-0.05 mm longis, vel obovoideis subsessilibus. Receptaculum ovoideo-conicum hirtum 2-3 mm diametro 2 mm altum, pilis hyalinis obtusis erectis, 0.1-0.7 mm. Paleae 4-3.5 x 2-1.3 mm, scariosae ovali-dilongae vel oblongo-dilatatae apice triangulate apiculatae apice, basin versus attenuatae valde amplectentes, pluribus venis albidis saepe bene conspicuis costa elevato-subcarinata sursum subapice densiuscule barbatae pilis erectis subrotundis crassiusculis acutis subobtusis et subclavatis 0.2-0.4 mm et copiosis glandulis capitato-pediculatis brevibus vel crassiusculis praecipue ad margines conspicuis.

Flores radii feminei 13-18 in capitulo 2-seriati. Corolla lutea 0.7 mm longa; tubo 0.4-1 mm apice annulo interno incrassato et minuto dente adaxiali obtuso exserto saepe conspicuo, extus dense patulo-antrorso-barbato pilis plus minusve flexuosis intricatisque vel rectis, crassiusculis, hyalinis, obtusis, 1-1.5 mm longis et glandulis capitatis 0.03-0.05 mm interspersis; limbo elliptica vel elliptico-oblonga vel obovato-oblonga 2.2-3.2 mm lata, apice rotundata breviter 2-3 dentata vel retusa basin attenuata aperta, conspicue 4-7-nervata, adaxiale minus mucronato-papilloso abaxiale dilute vel sparse pilosa pilis obtusis ad 0.5 mm et sparsis glandulis globosis sessilibus vel subsessilibus. Stylus 2.5-3 mm ramulis 1-1.2 mm longis. Achaenia nigra 2-2.3 x 1.5-2 mm obovata argute triangulata basi acute cuneata, dorso paulo e nucleo curvata, parce interiora laterale compressa irregulariter triangulata vel subquadrangulata 1-1.2 mm lata.

Flores disci pseudohermaphroditi 40-61 in capitulo. Corolla lutea 3.5-4.5 mm longa; tubulo 1.5-2 mm longo copiose vel parce piloso pilis patulo-antrorsis hyalinis crassiusculis obtusis 0.2-0.3(-0.4) mm, et glandulis pediculat-capitatis ad 0.05 mm sparsis vel raris; limbo infundibuliformi basi parvis vel parvisimis pilis vel glandulis, lobis oblongo-triangularibus acutis 0.7-0.8 mm longis margine incrassato dense papilloso, extus parvis vel parvisimis pilis fusca obtusis vel subclavatis 0.1-0.3(-0.4) mm et parvis glandulis subsessilibus. Antherae 1.5-1.6 mm longae basi apicatas appendice apicali ovata 0.4-0.5 mm longa. Stylus 4-5 mm sursum incrassatus. Nectarium 0.6-0.7 mm

longum tubulosum apice saepe paulo aperto.

Typus: Venezuela, Mérida: Betania, entre Páramo de Las Coloradas y El Molino, 2400 m, árbol 8 m ramificado, lígulas amarillas, 18-20 Jun 1974, López-Figueiras & Henry Rodríguez 9050; holotypus, US; isotypus MERF. Entre la capilla del Páramo de Las Coloradas y El Molino, 2600 m, arb. 5-6 m, algunos ramificados desde 1 m, otros indivisos, hojas coriáceas, inflorescencia axilar, lígulas amarillas, 18-20 Jun 1974, López-Figueiras & Henry Rodríguez 9049; MERF, US, paratypi. Páramo de Las Coloradas, borde camino frente a los potreros de San Rafael, 2700 m, arbusto ramificado 2-3 m, lígulas amarillas 18 Apr 1974, López-Figueiras & Carabot-Cuervo 8995 (MERF, US). Id. id. Los Aserruchos, 2800 m, tallo 5 m, hojas coriáceas, verdes, verdoso grisáceas más claras envés, vaina envolvente, estéril, 8 Feb 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28514 (MERF, US).

SENECIO BATALLONENSIS Cuatr. sp. nov.

Frutex parvus ad 0.5 m altus valde intricate divaricatos-ramosus foliosusque. Rami ultimi foliiferi dense crasse adpressequ albo-lanati, denique cicatricosi plus minusve lanuginosi, vetusti glabrati brunnescentes; rami majores robusti brunnei.

Folia crasse coriacea rigida breviter petiolata, alterna. Lamina elliptica basi obtusa vel rotundata apice obtuse subiteque mucronulata vel brevissime attenuata subapiculataque, 12-25 mm longa, 6-14 mm lata, margine satis revoluta visu integra vel levissime undulato-dentata, dentibus remotis callosis acutis antrorsis 0.2-0.4 mm longis patulis vel reflexis obsoletisque; supra viridis vernicosa nitidissima glaberrima tantum costa signata impressa ad basim lanata, nervis secundariis 4-7 utroque latere leviter depressis plus minusve notatis vel obsoletis; subtus crasse densissimeque cinereo-crispis-lanata, costa crassa elevata tantum conspicua etiam lanata nervis lateralibus obsoletissimis, superficie infra indumentum enervia sublaevi. Petiolus crassus 1-2 mm longus late vaginans ad ramum adpressus extus dense lanatus.

Inflorescentiae terminales rotundato-paniculatae 3-7 cm latae, basi foliosae, congeste floribundae, ramulis ramusculisque alternis angulatis brevibus crassis dense crassiusculeque incano-lanatis; pedicelli crassi 1-3 mm longi dense lanati; bractae subtendentes coriaceae elliptico-oblongae vel oblongae adaxiales virides vernicosae adaxiales lanatae.

Capitula discoidea elongato-cupulata circa 8-9 mm alta 7-9 mm diametientia, disco convexo visu luteo, 40-70 flores ferentia. Calyculus 7-8 bracteolis subcoriaceis linearibus attenuatis subacutis 4.2-5.2 x 1.3-1.8 mm, inferne vel omnium apice excepto dense lanatis, ad apicem pedicelli gradatim instructis. Involucrum pallido-viride, campanulatum basi albo-lanatum phyllaria 8, crassiuscula, interiora latiora 6.1-6.5 x 3.5-3.8 mm ovalia apice subacutata margine membranacea, tria exteriora 6.2-6.6 x

1.8-2 mm oblonga sursum attenuata, intermedia late oblonga 6.1-6.5 x 2.5(-3.2), apice minutissime pilosula, marginibus parce pilosula, dorso sursum glabra, basin versus plus minusve basi dense lanuginea. Receptaculum convexum 2.5-3 mm diam, marginibus divalvurum longe fibrillatis apicis acutis 1 mm longis. Flores omnes hermaphroditi. Corolla 4.8-5.4 mm longa viridilutescens, apice luteola, glabra, tubo 1.2-1.5 mm longo, limbo tubuloso, lobis brismpilaribus vix patulis vel recurvis 0.8-0.9 mm longis margine ad apicem dense papilloso-piloso pilis 0.05-0.1 mm. Antherae 1.0 mm longae basi sagittatae minutissime ciliatae, cauda 0.15 mm. Filamenta infra insertum antherae incrassata. Semi styli exserti apice asymmetrico truncato, penicillato-cornuto, pilis 0.05-0.1(-0.25) mm obtusis, marginibus late papilloso-stigmaticis. Ovarium glabrum 5-striatum basi annulo calloso. Pappus 2(-3)-seriatus 5 mm longus, pilis scabridis apice inaequaliter bidentatis.

Typus: Venezuela, Táchira: Páramo del Batallón, en loma despejada, paramuna, con espeletietum, 9 km de la Torre de Televisión, 4400 m alt, frutax 20-50 cm, hoja coriacea rígida verde brillantísima haz, cinéreo-afelpada envés, involucros verde claros, disco amarillo, corolas verdoso-amarillentas, estilos amarillos, 22 Jan 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28415; holotypus US; isotypus MERF.

Senecio batallonenis belongs to section *Granata* Cuatr., being closely related to *S. unicolor* Turcz. The endemic species from Páramo del Batallón is distinguished by its dwarf and compact almost prostrate habit, by the elliptic, subsessile, thick leaves, by the glomerate inflorescences with short, thick pedicels bearing relatively larger heads, and by the compact, lanate indumentum on branchlets, leaves (beneath) and inflorescences.

SENECIO LIBERTATIS Cuatr. sp. nov.

Frutex 1-2 m altus. Rami erecti striati copiose cicatricoso-tuberculati ad cicatrices copiose antrorsa-barbati ceterum plus minusve lanuginosum. Ramuli elongati erecti dense foliosi internodiis brevibus densiuscule barbatis pilis flexuosis ascendentibus vel intricatis 1-1.5 mm longis.

Folia alterna brevis subsessilia crasse coriacea plasto-viridia, antrorsa vel patulo-antrorsa. Lamina 6.5-10 x 2-3.2(-3.6) mm carnosula oblonga apicem leviter attenuata subacuta vel subobtusae circa basin attenuata et in pseudopetiolulum 1-1.5 mm longum et latum vix agentem transiens; margine crenata crenis saepe fere deplanatis sed sinibus argutis et longe barbatis pilis in juvenili statu usque ad 1 mm tenuissimis flexuosis copiosis intricatisque in vetustis saepe contractis vel reductis; utrinque in vivo laevia, nervia margine non incrassata, in vivo rugulosa et interdum margine leviter crassiori, saepe paulo incurva seu abaxiale convexa, costa vulgo inconspicua interdum abaxiale leviter impressa (in vivo) et ad basin lanuginosula, reliqua superficie glaberrima. Pseudopetiolus 1-1.5 mm longus 1 mm latus, crassus,

extus carinatus, adaxiale sulcatus breviterque lanuginosus ad basim barbatus, erectus ad caulem adpressus.

Inflorescentiae terminales corymbosae, folia valde excedentes, usque ad 20 capitulis radiatis graciliter pedicellatis instructae. Pedicelli 1.5-2.5 cm longi, teneri, argute striati, luteo-virides, laxae albido-lanuginosi pilis patulis tenuibus valde flexuosis albis intricatis vestiti, bracteolati bracteolis alternis membranaceis linearibus acutatis sparse ciliolatis 4-3 x 1-0.7 mm, luteo-viridibus, ad apicem 7-9 bracteolis lineari triangularibus, 2.3-3 x 0.8-1 mm ad modum calyculi dispositis. Capitula cylindracea 7-9 mm alta circulo ligularum 11-15 mm, disco 4-5 mm diametro. Involucrum tubulosum viride 4-4.5 mm altum 4 mm diam. Phyllaria 13 in capitulo, crassa, 3.7-4 mm alta, exteriora lineari subulata circa 0.9 mm lata, interiora cum margine scarioso ovalia 1.3 mm lata sed visu etiam linearia, omnia acuta apice ad marginem ciliolato reliqua glabra. Receptaculum planum alveolatum marginibus alveolorum dentatis, 2.2-2.4 mm diametro. Flores marginales feminei ligulati 5-8 in capitulo; corolla lutea 6.5-7.5 mm longa, crassiuscula, tubo 2 mm longo glabro, lamina elliptica vel oblongo-elliptica 2 mm lata, apice rotundata minuteque bidentata, tenuiter 4-7-nervata, basi adaxiale in angulo acuto aperta, omnis glabra sed apice argute mamillato-papillosa; stylus 3.5 mm ramis subulatis 0.7 mm; ovarium 1 mm glabrum. Flores hermaphroditi 15-20 in capitulo; corolla lutea 4.3-4.8 mm longa, glabra, tubo 2.2 mm, limbo tubuloso, lobis 0.8-1 mm longis, oblongo-triangularibus apice paulo incrassato acuto minute cucullato, conspicuissime mamillato-papilloso; filamenta infra antheram valde incrassata, antherae 1.5 mm longae basi acutissime sagittatae; ovaria 1.5 mm glabra; rami styli apice truncato papilloso breviter piloso-coronato, adaxiale duobus lineis stigmaticis crassis, abaxiale sursum longe papilloso. Achaenia elliptico-oblonga, 2.2 mm longa 0.5 mm lata basi crasse callosa obtuse 5 costata cum 5 venis conspicuis et 5 venis alternantibus fere obsoletis. Pappus albus 3-3.5 mm altus pilis biseriatis strigosus extremo leviter ampliatis, saepe apice inaequaliter et acute 2-3-dentatis.

Typus: Venezuela, Mérida: Páramo de Las Coloradas, Loma de la Libertad arriba de El Portachuelo (El Ramal), 2850 m alt, arbusto 1-2 m, lígulas y flósculos amarillos, 8 Febr 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28512; holotypus, US; isotypus MERF.

Senecio libertatis belongs to section *Arbutoides* Cuatr., being closely related to *S. pachypus* Greenm and *S. quiroranus* Cuatr. From both relatives it differs mainly in its oblong leaves, acute at apex and narrowed basally into the short petiole, the blades being thick and smooth in life, leadish-green and dull, without thickened margins, the teeth being less prominent, usually almost flattened in the new species with deep notches provided with a long bunch of slender, intricate, flexuose hairs. Besides, the leaves are ascendent slightly incurved, rather concave or sulcate adaxially. The other two mentioned species have ovate or elliptic leaf blades rounded or obtuse at base, thickly marginate beneath, stronger crenate, and usually

bent in a spreading or reflexed position. The thinner hairs at the branchlets and other features of the bracts distinguish also *S. libertatis*. Furthermore, *S. pachypus* differs by its shining leaves.

Acknowledgement

The collaboration and support received by the author for the field work of this monographic program, given by the Facultad de Farmacia of the University of Los Andes, Mérida, Venezuela, is very much appreciated. The Facultad de Farmacia has provided excellent transportation and other facilities during the author's trips to the Venezuelan Andes in 1969 and 1973, as well as the invaluable, direct personal help from professors J. Qui-Warén and M. López-Figueiras in the field work and preparing specimens. The continued subsequent cooperation of both colleagues in seeking flowering specimens of *Rapalloa* at type localities and other suspected undescribed species, often in difficult reachable spots, is likewise, extremely appreciated. This cooperation has provided the author with a substantial amount of first-class prepared herbarium material very much needed for completion of his current program. Credit has to be given to the professors Dr. Fernando Pérez Barré, dean of the Facultad de Farmacia; Dr. Hildebrando Rodríguez, the former dean, and Ing. Carlos Liscano of the Facultad de Forestales and formerly Vice-Rector of the University of Los Andes for providing facilities. They have to be praised for their leadership in sponsoring botanical explorations and research in their respective institutions.

NOTES ON NEW AND NOTEWORTHY PLANTS. LXXIII

Harold N. Moldenke

CEROTHAMNUS HETEROPHYLLUS (Raf.) Moldenke, comb. nov.

Myrica heterophylla Raf., Alsog. Amer. 9. 1838.

PAEPALANTHUS KARSTENII var. COREI Moldenke, var. nov.

Haec varietas a forma typica speciei scapis maturis plerumque 1--2 cm. altis recedit.

This variety differs from the typical form of the species in having its mature inflorescences on peduncles averaging only 1--2 cm. in length, mostly shorter than, equaling, or just barely surpassing the uppermost leaves.

The type of the variety was collected by my very good lifelong friend and colleague, Earl Lemley Core (no. 272a) -- in whose honor it is hereby named -- on a páramo above Purace, Cauca, Colombia, at an altitude of 11,000 feet, on February 19, 1944, and is deposited in the Britton Herbarium at the New York Botanical Garden.

TRACAULON ARIFOLIUM var. PUBESCENS (Keller) Moldenke, comb. nov.

Polygonum sagittatum var. pubescens Keller, Bull. Soc. Bot. Belg. 30 (2): 45. 1891.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LI

Harold N. Moldenke

PAEPALANTHUS FOLIOSUS Körn.

Additional synonymy: Dupatya foliosa Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 333--334 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 190, 196, 197, [283], & 290. 1903; Alv. Silv., Fl. Mont. 1: 406. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 98, 280, & 487. 1959; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 951. 1971.

This species is based on Sellow B.1298/C.276 from the Serra do Santo Antonio, Minas Gerais, Brazil, deposited in the Berlin Herbarium where it was photographed by Macbride as his type photograph

number 10607. Silveira (1928) cites A. Silveira 48 from the Serro Pouse Alto, Minas Gerais, collected in 1908. Ruhland (1903) cites only the type specimen.

The Mello Barreto 5301 [Herb. Jard. Bot. Belo Horiz. 12587], distributed in some herbaria as P. foliosus, is actually P. nigricaulis Alv. Silv.

Citations: BRAZIL: Minas Gerais: Sellow B.1298/C.276 [Macbride photos 10607] (B--type, B--isotype, N--photo of type, N--photo of type, W--photo of type, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körncke (B).

PAEPALANTHUS FORMOSUS Moldenke, Bol. Soc. Venez. Cienc. Nat. 14: 11. 1952.

Bibliography: Moldenke, Bol. Soc. Venez. Cienc. Nat. 14: 11. 1952; Moldenke, Résumé 72 & 487. 1959; G. Taylor, Ind. Kew. Suppl. 12: 101. 1959; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146] & 166. 1969; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 951. 1971; Moldenke, Phytologia 28: 436 & 439. 1974.

The Maguires report this plant as "abundant", "common", "frequent", and "locally common" on savannas, at altitudes of 1250 to 1500 meters, and describe it as a herbaceous perennial or biennial, 5--15 dm. tall, flowering and fruiting in February and March and dying after flowering. Murça Pires and his associates encountered it on savannas and in "terrestre à beira do campo" at 425 m. altitude, describe it as 1.5 m. tall, and found it in fruiting condition in December.

Citations: VENEZUELA: Amazonas: Maguire & Maguire 35177 (N, N), 35235 (N, N, N), 35274 (Mu, Mu, N, N), 35432 (N, N); Maguire, Phelps, Hitchcock, & Eudowski 31754 (N--type), 31784 (N, Ve). BRAZIL: Pará: Murça Pires, Black, Wurdack, & Silva 6372 (N, N), 6373 (N).

PAEPALANTHUS FRATERNUS N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 69--70. 1901.

Bibliography: N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 69--70. 1901; Burkill, Trans. Linn. Soc. Lond. Bot., ser. 3, 6: 13. 1901; Ruhl, in Engl., Pflanzenreich 13 (4-30): 222--223 & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 6, 48, & 60. 1946; Moldenke, Alph. List Cit. 2: 352 (1948) and 3: 975. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64, 66, & 209. 1949; Moldenke, Phytologia 20: 109 & 296. 1970; Moldenke, Fifth Summ. 1: 125 & 130 (1971) and 2: 951. 1971.

This species is based on McConnell & Quelch 96 & 659 from the summit of Mount Roraima, at 8000 feet altitude, Guyana, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. Ruhland (1903) inaccurately cites Brown's original reference as "Trans. Linn. Soc. VI, 1, (1901) 69" [actually it is in series 2, volume 6], and comments that the "Species mihi incognita, ex cl. descriptore cum P. falcato Koern. et P. flavescente Koern. (=Leio-

thrix falcata Ruhl. resp. *L. flavescens* Ruhl.) affinis. Sed in speciebus *Leiothericis* capitula non albo-villosa. Eadem species cum *P. Schomburgkii* Klotzsch affinis esse dicitur, sed hic verus *Paepalanthus* est et a speciebus 2 supra commemoratis *Leiothericis* valde alienus". Brown (1901) says that it is "Allied to *P. falcatus*, Koern., and *P. flavescens*, Koern. From the former it differs by its more rigid, channelled leaves, less woolly heads, and more acute involucre bracts, and from *P. flavescens*, Koern., by the narrower and more acute leaves, which have a different pubescence, and the very different flower-heads. It also appears to be near *P. Schomburgkii*, Klotzsch (which I have not seen), but that plant is described as having longer and broader leaves, striate, with prominent veins on the upper side, a subulate point to the peduncular sheath, much shorter peduncles, and glabrous involucre bracts."

Gleason, in his unpublished flora of British Guiana, describes *P. fraternus* as follows: "Caudex very short, densely woolly; leaves rosulate, rigid, more or less recurved, 2--3 mm. wide, 2--4 cm. long, broadly and abruptly dilated at base, white-pubescent above; peduncles 1--3, 1--4 dm. tall, sparsely villous, their sheaths much exceeding the leaves; heads hemispheric, 8--10 mm. wide, cinereous; bracts imbricate in several series, appressed, ovate, pubescent. Summit of Mount Roraima, McConnell & Quelch 96, 659, 660 (Jerman herbarium only), Tate 434, 451 (Endemic)."

Recent collectors have found this plant growing in acid mud and on dryish open savannas between low forests, at altitudes of 1925 to 3000 meters, flowering in January, February, April, and September, describing it as a low tufted herb, the hairy leaves flaccid, shining, rich-green or deep-green but not bluish-purple and *Stegolepis*-like as in *P. stegolepoides* Moldenke, the scales pale-green, the involucre blackish below, the bracts gray-brown, the flowering-heads dusky- or dull-white, and the flowers white. Wurdack refers to the species as "frequent in small clumps on the upper cumbre and in deep canyons", while he and Steyermark found it "locally frequent in dense masses".

Wurdack 34213 is a mixture with *Syngonanthus acopanensis* Moldenke, while Tate 434 is a mixture with *Leiotherix flavescens* var. *alpina* Moldenke. Material of *P. fraternus* has been misidentified and distributed in some herbaria as *P. convexus* Gleason.

Additional citations: VENEZUELA: Bolívar: Cardona 2703 (W—1997709); Irwin 447 (W—2197669); Pannier & Schwabe s.n. [Auyan-tepui] (Ve); J. A. Steyermark 58876 (N), 93897 (Lw, N, S), 93959 (Z); Steyermark & Wurdack 490 (Mu, N), 1045 (N); Vareschi & Foldats 4855 (Ve); Wurdack 34213, in part (N). GUYANA: G. H. H. Tate 434, in part (N), 451 (N).

PAEPALANTHUS FREYREYSII (Billb.) Körn. in Mart., Fl. Bras. 3 (1): 370 [as "*freyreissii*"]. 1863.

Synonymy: Eriocaulon freyreysii Billb. in Thunb., Pl. Bras. Dec. 1: 7, pl. 1, fig. 2. 1817. Eriocaulon freyreisii Billb. apud Roem. & Schult., Mant. 2: 468. 1824. Eriocaulon paludosum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625—626 & 651, pl. 9. 1831. Eriocaulon freyreisii Thunb. ex Bong., Ess. Monog. Erioc. 34. 1831. Paepalanthus paludosus Kunth, Enum. Pl. 3: 502 & 625. 1841. Eriocaulon freurisii Billb. ex D. Dietr., Syn. Pl. 5: 266. 1852. Eriocaulon freyreissii Thunb. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 334. 1855. Paepalanthus freyreis-sii Körn. in Mart., Fl. Bras. 3 (1): 370—371. 1863. Eupaepalanthus freyreissii Körn. ex V. A. Pouls., Vidensk. Meddel. Kjöbenh. 1888: 321. 1888. Dupatya freyreissii (Thunb.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya freyreissii Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus freyreissii (Thunb.) Körn. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 135. 1903. Paepalanthus freyreissi Körn. ex Alv. Silv., Fl. Mont. 1: 406. 1928. Paepalanthus glaucus Mart. ex Moldenke, Fifth Summ. 2: 583, in syn. 1971.

Bibliography: Thunb., Pl. Bras. Dec. 1: 7, pl. 1, fig. 2. 1817; Roem. & Schult., Mant. 2: 468—469. 1824; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625—626 & 651, pl. 9. 1831; Bong., Ess. Monog. Erioc. 5, 6, 13, 26, & 51—52, pl. 9. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 502, 524, 572, 574, 578, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 259 & 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 278—279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 370—371 & 507. 1863; V. A. Pouls., Vidensk. Meddel. Kjöbenh. 1888: 321. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 125, 135—136, [283], 285, 286, 290, & 291. 1903; Alv. Silv., Fl. Mont. 1: 102 & 406. 1928; Stapf, Ind. Lond. 3: 90 & 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 35, 38, 48, & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 144. 1952; Moldenke, Résumé 98, 280, 288, 291, 294, 325, 327, & 487. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Renné, Levant. Herb. Inst. Agron. 70. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 17: 3, 10, & 11 (1968) and 18: 10. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 166, 174, & 189. 1969; Moldenke, Phytologia 20: 113 & 259. 1970; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 500, 508, 518, 583, 587, & 951. 1971; Moldenke, Phytologia 25: 162. 1973.

Illustrations: Thunb., Pl. Bras. Dec. 1: pl. 1, fig. 2. 1817; Bong., Mém. Acad. Imp. Sci. St. Péters., ser. 6, 1: pl. 9. 1831;

Bong., Ess. Monog. Erioc. pl. 9. 1831.

This species appears to be based on Freyreiss 7 deposited in the Stockholm herbarium, while Eriocaulon paludosum is based on L. Riedel 445 from Itacolumi, Minas Gerais, Brazil, deposited at Leningrad. The type of P. glaucus is Martius s.n. from "in fontium limpidorum margine ad Villa do Principe in Serro Frio", Minas Gerais, Brazil, deposited in the herbarium of the Botanical Museum at Munich.

Billberg (1817) comments: "Obs. Flores feminei cum masculis in disco mixti, nec in radio siti, ut in E. sexangulari. Eriocaulon omnia monoica esse videntur." Dietrich (1852) describes the plant simply as "culmo 3-gono; fol. setaceo-linearibus; capitulo hemisphaerico. In Brasilia. ♂."

Jackson (1893) reduces Eriocaulon paludosum to Paepalanthus plantagineus (Bong.) Körn. Kunth (1841) maintains that the species under discussion here is related to what is now called Leiothrix graminea (Bong.) Ruhl. and to L. spiralis (Bong.) Ruhl., but this resemblance is certainly only superficial. The P. Clausen s.n., distributed as P. freyreisii, is actually P. cachambuensis Alv. Silv.

Recent collectors have found P. freyreisii growing in swamps, Sphagnum bogs, rocky soil, and damp sandy rather stony soil, flowering in February, June to August, and December.

Silveira (1928) cites A. Silveira 259 from Itacolumi, Minas Gerais, deposited in his own herbarium. Ruhland (1903) cites, also from Minas Gerais, Freyreiss s.n., Glaziou 15545 & 18585, Langsdorff s.n., Magalhães Gomes, Herb. Geogr. & Geol. Minas 625, Martius s.n., Pohl s.n., L. Riedel 445, Schwacke 9205, 9326, 9977, & 12381, and Vauthier s.n., all deposited in the Berlin herbarium.

Additional citations: BRAZIL: Minas Gerais: Freyreiss 7 (F—photo of type, N—photo of type, S—type, Z—photo of type); Glaziou 15545 (Br, N); Magalhães Gomes & Silveira 67 [Herb. Jard. Bot. Belo Horiz. 26711] (N); Martius s.n. [Villa do Principe, Serro Frio; N. Y. Bot. Gard. type photos, new ser., neg. 8838] (Mu, N—photo, Z—photo); J. E. Pohl s.n. [in irriguis montanis, 1818] (Br); L. Riedel 445 [N. Y. Bot. Gard. type photos, new ser., neg. 8837] (B, Mu, N—photo, Ut—361, Z—photo), 448 (M, N—photo, S, Z—photo). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 9. 1831 (N, Z).

PAEPALANTHUS FULGIDUS Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 279—280. 1957.

Bibliography: Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 279—280. 1957; Moldenke, Résumé 72 & 487. 1959; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 951. 1971; Moldenke, Phytologia 23: 211 & 418.

1972; Anon., Biol. Abstr. 54 (4): B.A.S.I.C. S.189. 1972; Moldenke, Biol. Abstr. 54: 1725. 1972; Hocking, Excerpt. Bot. A.23: 290. 1974.

Citations: VENEZUELA: Bolívar: B. Maguire 33383a (N--type).

PAEPALANTHUS FULGIDUS var. ZULOAGENSIS Moldenke, Phytologia 23: 211. 1972.

Bibliography: Moldenke, Phytologia 23: 211 & 418. 1972; Anon., Biol. Abstr. 54 (4): B.A.S.I.C. S.189. 1972; Moldenke, Biol. Abstr. 54: 1725. 1972; Hocking, Excerpt. Bot. A.23: 290. 1974.

Citations: BRAZIL: Amazonas: J. A. Steyermark 103839 (N--type).

PAEPALANTHUS FUNCKEANUS Körn. in Mart., Fl. Bras. 3 (1): 404--405. 1863.

Synonymy: Dupatya funkeana (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya funkeana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus funckianus Körn. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 206. 1903. Dupatya funckiana Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 206, in syn. 1903. Dupatya funckeana Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): [283], in syn. 1903.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 404--405, 502, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 206, [283], & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 6, 29, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 72, 280, 325, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 18: 9. 1969; Moldenke, Fifth Summ. 1: 125 & 481 (1971) and 2: 951. 1971.

This species is based on Funck & Schlim 809 from Agua de Obispo, at an altitude of 2600 meters, Trujillo, Venezuela, flowering in August, and deposited in the Berlin herbarium. An isotype in the Delessert Herbarium at Geneva was photographed there by Macbride as his type photograph number 25168. The surname of the first of the two collectors is misspelled [Funcke] in the Brussels herbarium and elsewhere.

Ruhland (1903) comments that the "Vaginae a cl. Koernicke non recte descriptae". He cites only the original collection, which seems to be the only collection known so far.

Citations: VENEZUELA: Trujillo: Funck & Schlim 809 [Macbride photos 25168] (B--type, Br--isotype, N--isotype, N--photo of isotype, N--photo of isotype, W--photo of isotype).

PAEPALANTHUS FUSCOATER Körn. in Mart., Fl. Bras. 3 (1): 382--383. 1863.

Synonymy: *Paepalanthus fusco-ater* Körn. in Mart., Fl. Bras. 3 (1): 507. 1863. *Dupatya fuscoater* (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. *Dupatya fuscoater* Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. *Dupatya fuscoatra* Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 179, in syn. 1903.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 290, 382—383, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 179, [283], & 290. 1903; Alv. Silv., Fl. Mont. 1: 181 & 407. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 98, 280, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 583 & 951. 1971; Moldenke, Phytologia 26: 114. 1973.

This species is based on a Riedel collection from stony localities near Tejuco, Minas Gerais, Brazil, flowering in December, and deposited in the Berlin herbarium. Ruhland (1903) cites only the original collection and this appears to be the only known collection of the species so far. He comments that "Petalorum tubo floris ♂ intus piloso insignis".

PAEPALANTHUS FUSCOATER var. MINOR Alv. Silv., Fl. Mont. 1: 181 [as "*minora*"]. 1928.

Synonymy: *Paepalanthus fuscoater* var. *minora* Alv. Silv., Fl. Mont. 1: 181 & 407. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 181 & 407. 1928; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 583 & 951. 1971.

This variety is based on *A. Silveira* 782 collected in sandy fields between Serro and Diamantina, in the Serra Geral, Minas Gerais, Brazil, in January of 1925, and deposited in the Silveira herbarium. Silveira (1928) describes it as "Folia minora — 2—4 cm longa, 1,5—3-mm medio lata" and on page 407 of his work gives the date of collection as "1926", but whether this is a misprint or is intended as a correction of the date previously given is not clear.

PAEPALANTHUS FUSCUS Alv. Silv., Fl. Mont. 1: 243—244, pl. 162. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 243—244 & 407, pl. 162. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 &

209. 1949; Moldenke, Phytologia 4: 114. 1952; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.
 Illustrations: Alv. Silv., Fl. Mont. 1: pl. 162. 1928.

This species is based on A. Silveira 786, collected in sandy fields between Diamantina and Serro, in the Serra Geral, Minas Gerais, Brazil, in June of 1925, and deposited in the Silveira herbarium. On page 407 of his work, Silveira (1928) gives "1926" as the date of collection, but, again, whether this is a misprint or is meant to be a correction of the date given in the original description is not clear. Also, in his text Silveira cites the illustration as plate "CXLI", but plate 142 is actually an illustration of P. percrassus Alv. Silv. and is in its proper sequence. The illustration of P. fuscus should have been cited by him as pl. 162, which it actually is. Thus far the species is known only from the type collection.

PAEPALANTHUS GARDNERIANUS Walp., Ann. Bot. Syst. 1: 889. 1849.

Synonymy: Cladocaulon brasiliense G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: pl. 528. 1843 [not Paepalanthus brasiliensis (Mart.) Mart., 1855]. Eriocaulon cladocaulon Steud., Syn. Pl. Glum. 2: [Cyp.] 276. 1855. Dupatya gardneriana (Walp.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya gardneriana Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 176, in syn. 1903.

Bibliography: G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: vi & viii, pl. 528. 1843; Walp., Ann. Bot. Syst. 1: 889. 1849; Steud., Syn. Pl. Glum. 2: [Cyp.] 276, 333, & 342. 1855; Körn. in Mart., Fl. Bras. 3 (1): 278, 373—374, & 507. 1893; Benth. in Benth. & Hook. f., Gen. Pl. 3 (2): 1023. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 552 & 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 173, 175, 176, [283], 285, & 290. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 552 & 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 28, 29, 33, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 114. 1952; Moldenke, Résumé 98, 259, 280, 287, & 487. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 552 & 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 162, 438, & 481 (1971) and 2: 497 & 952. 1971; Moldenke, Phytologia 26: 142. 1973.
 Illustrations: G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: pl. 528. 1843.

Ruhland (1903) cites the original publication of Paepalanthus gardnerianus Walp. (1849) as "1848", but actually only pages 1—384 of Walper's work were published in 1848; pages 385—1127 did not actually appear in print until 1849.

Cladocaulon brasiliense G. Gardn. is actually the type species of the genus Cladocaulon. Its specific type is G. Gardner 5250, which, he says, was "Rare on the ascent of Serra da Mendanha, from the Rio Jiquitimonha, [in the] Diamond district", Minas Gerais, Brazil, collected in July, 1840. Walpers' binomial is based on the same type and he notes that "Generice a Paepalanthus non differt". Ruhland (1903) cites only the type collection and notes "Specimen non vidi". Only the one previously cited isotype has been seen by me.

Gardner (1843) says that "The remarkable habit of this plant, as well as the curious structure of the female flowers, justly entitle it to rank as a distinct genus. The habit is well represented by the artist [of plate 528], but the dissections are very far from being correct. The female flower I always find to be such as is given in the description, and not that of a true species of Paepalanthus, as represented in the plate. Nor are the lobes of the inner series of the perianth of the male flower pilose."

It is perhaps worth noting here that the note appended to a clipping in the herbarium of the New York Botanical Garden implying that the original publication of the name, P. gardnerianus, should be credited to "L. C. Rich. in Walp., Ann. Bot. Syst. 1: 889. 1848" is erroneous. Consultation of the original reference shows plainly that Richard is there cited as the original authority for the group name Eriocaulaceae, not as author of the descriptions which follow in that section of the work. It should also be mentioned that "270" is sometimes cited as the page of the original publication of Eriocaulon cladocaulon Steud., but this is apparently a typographic error for "276".

PAEPALANTHUS GARIMPENSIS Alv. Silv., Fl. Mont. 1: 251—253, pl. 162. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 251—253 & 407, pl. 162. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Renné, Levant. Herb. Inst. Agron. 70. 1960; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 167. 1928.

Silveira (1928) bases this species on A. Silveira 557, collected "Secus margines rivuli in campis in Serra do Garimpo, inter Caeté et Santa Barbara", Minas Gerais, Brazil, in April of 1909, but on p. 407 of the same work he cites Silveira 909 from "Serra do Garimpo prope Cocaes, 1909", perhaps as a second collection. On p. 253 he cites his illustration as "Tabula CLXII", but the plate itself is labeled "CLXVII". He comments that the "Species inter illas quae bracteas involucrantes discum paullum superantes habent, calore bractearum involucrantium facile distinguitur."

[to be continued]

BOOK REVIEWS

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"BOTANY. (A GOLDEN SCIENCE GUIDE)." by R.R. Alexander, R.W. Burnett, and H.S. Zim, 160 pp., many col. figs., Golden Press, Western Publishing Co., Inc., 859 Third Ave., New York 10022. 1970. \$4.95.

An attractive small book which is designed to interest and educate in the elements of botany, including areas of morphology, physiology, taxonomy, genetics, evolution, and ecology. It is designed to be used by adults as well as students in the high school and college. Great compression of subject matter results in coverage of a large number of facts in this 5 by 7½ inch format.

GMH

"POISONOUS PLANTS OF HAWAII" by Harry L. Arnold, M.D., II+71, 24 pls., Charles E. Tuttle Co., Publishers, Rutland, Vt. 1968. \$2.50

In this reprinting of a book originally published in 1944, there are two chapters: I) the common and dangerous plants of Hawaii, including those which are allergenic and the fungi; II) a comprehensive plant list, with alphabetic arrangement by the generic name. Over 90 taxa are taken up, with illustrations of about one third of these. Besides the table of contents, there is an index and preceding this a bibliography. The author is a physician resident in Hawaii, well acquainted with the plants and well informed on the poisonings which occur in that State from plant contact or ingestion. Many of the plants taken up are found in other parts of the world (ex., Nerium oleander).

GMH

"POLYSACCHARIDES. (SERIES: A COURSE IN ORGANIC CHEMISTRY)." by Gerald O. Aspinall, xvi, 228 pp., many figs. and tabs., 1 portr.(frontispiece), Pergamon Press, Oxford (etc.), Elmsford, New York 10523. 1970. \$8.75 (Hardback).

In this small volume we have an excellent survey for college and university students of the important things about the polysaccharides, those substances made up primarily of series of sugar molecules linked together by the removal between each pair of a molecule of water, hence representing sugar anhydrides. The Professor of Chemistry at Trent University in Ontario (Canada) has split the subject matter into 14 chapters, with a preliminary discussion of the terminology of carbohydrates and a terminal index. Each chapter is provided with an abundance of timely references. This book would therefore be of great service to a graduate student or one doing research in the field. Besides the usual formulas and reactions there are two schemes on fold-up sheets. The text is generally clear and unburdened by technicalities. The subjects run in the following order: general; isolation and determination of structure; cellulose; starch and glycogen; other glucans (= glucosans) and fructans (= fructosans); mannans, galactomannans, and glucomannans; galactans, arabinans, and xylans-glycuronans; complex acidic polysaccharides (gums, mucilages); sulfated polysaccharides; aminopolysaccharides; biosynthesis; and other carbohydrate-containing macromolecules (teichoic acid, glycoproteins, etc.).

GMH

"MARINE PHARMACOLOGY" by Morris H. Baslow, (Ph.D), xiv, 286pp., many figs. and tabs., 4 col. pls., The Williams and Wilkins Co., Baltimore, Maryland. 1969. Price not given.

In this work, rendered attractive by both the title and the brilliant color plates in the front part of the text, there is consideration of possible medicinal values of both plants and animals, with greater stress on the latter. Thus, 69 pages are devoted to plant organisms (pp. 17-85) and 168 pages (pp. 86-253) to the animals. The first chapter is introductory, while Chapter Two treats of the antibiotic activity of sea water, of particular interest here being the relatively strong antiviral (virus inactivating capacity) of this abundant product. (The practical therapeutic possibilities are however considered rather slim). Chapters 3 to 7 deal with various groups of plants, mostly algal. Chapter 3 is concerned with Schizophyta (Bacteria) and the Eumycophyta (Fungi). Among the values discussed in this chapter are antibacterial activity, antiviral potency, "antiyeast" factors, bacterial toxins, and vitamin sources. Cyanophyta, the Blue-green Algae, are taken up in chapter 4, the Pyrrhophyta (Dinoflagellates) and Cryptophyta (Cryptomonads) in chapter 5, the Chrysophyta (Yellow-green and Golden-brown Algae, and Diatoms) in chapter 6, and the Chlorophyta (Green Algae), Phaeophyta (Brown Algae), and Rhodophyta (Red Algae) in chapter 7. Of the remaining nine chapters, all but the final one are taken up with discussions of 13 animal phyla, using a classification system explained in

a table on pages 5 and 6. Chapter 16 is a summary of the pharmacological potentials of the various substances isolated from marine organisms, plant and animal: this takes the form of tables 19 pages long. A terminal index seems quite comprehensive. At the end of each chapter as well as at the end of the various sections within the chapters many useful references appear. The pages are replete with figures and tables as well as with structural formulas for many compounds. The text is well printed and well bound. This is a book which should be in high demand by librarians as well as by individual scientists.

GMH

"LEHRBUCH DER ANGEWANDTEN BOTANIK," Ed. 1, by Walter Baumeister and Gerhart Reichart, XVI + 490 pp., 188 figs., 68 tabs., Gust. Fischer Verlag, Stuttgart, 1969, cloth bound, DM 68.-

In this textbook of applied botany, the cultivated plants of the world are considered from many standpoints, with eight sections of the text devoted to these various areas. There is a quite remarkable symmetry in these well-rounded treatments, which will be obvious from comparing the number of text pages devoted to each: General review of cultivated plants, with consideration of the type of products concerned, amounts produced in various parts of the world, common types of usage, etc. (39 pp.); Morphology of cultivated plants (47 pp.); Anatomy (48 pp.); Substances required by plants (fertilizers, atmosphere, etc.) (73 pp.); Development of these plants (growth from seedling to mature plant) (60 pp.); Production of substances by cultivated plants (essential oils, tannins, etc.) (78 pp.); Diseases and infestations (34 pp.); Plant sociology (sociological plant geography) (82 pp.) This is followed by a classified list of teaching and research institutions in the field of cultivated plants (7 pp.); and the index (22pp.).

In descending order, the three longest sections are plant sociology, production of plant substances, and substance requirements of plants. The plants and plant products considered in this text include food and fodder plants (ex. rye and other cereal crops; legumes; potatoes; other starch-producing plants, such as manioc; sugar plants; fatty oil plants, such as olive tree; fruit and vegetable plants, such as tomatoes); beverage plants like coffee and popular plant "stimulants", such as tobacco; drugs (like Valerian) and spices (as cinnamon); fiber plants (flax); lumber plants (as oaks); plants producing rubber, gutta percha, balata, and chicle; and resin and balsam plants (ex. rosin).

Such an imposing array of useful plants must certainly be of interest to a large variety of individuals. With such a bait the theoretical aspects of botany would become quite

attractive. Why then not adopt economic or applied botany in the college curriculum as a beginning course to be followed by the more theoretical branches with their phytogeography, ecology, genetics, and chorology? It would be a case of the "entering wedge." A book like this in the English language should be most attractive and have a ready sale.

GMH

"AUSTRALIAN NATIVE ORCHIDS IN COLOUR" by L. Cady and E.R.

Rotherham 112 pp., 102 col. pls., 7 col. pls. on dust jacket, Charles E. Tuttle Co., Rutland, Vermont 05701. 1970 (recd. 1972). \$6.75

This small hard-backed volume is beautifully embellished with handsome colored pictures of about 100 native Australian taxa of Orchidaceae. (The seven color plates on both the dust cover and the regular cover are not reproduced in the pages of the book). The book is far more than simply a picture book, however; the descriptive text is quite technical and is obviously written for botanists. The book belongs to every library of botany seeking or possessing a comprehensive collection in the field.

An attempt was made to describe a broad representative collection of the orchids of the Australian continent. Of the 85 genera of orchids known from Australia, 70 are either shown in color or have been discussed. 15 genera with 27 spp. have not been taken up.

GMH

"FOUNDATIONS OF PLANT GEOGRAPHY" by Stanley A. Cain, xiv + 556 pp., 63 figs., 32 abs., Hafner Publishing Co., Inc. 1971 (1944). \$11.95.

Several things can happen to a book after publication: it may be very popular, a best seller, so that the edition is soon exhausted; the book may be a slow seller but useful and important to some specialists: this edition may be kept for many years in stock (one Dutch firm is still selling books printed in 1923 or before; the Government Printing Office at Washington, D.C., was a few years ago able to sell copies of the Congressional Digest or its predecessor which had been printed in the 1700's) or the publishers may destroy the remainder or sell it for a nominal fee to some dealer. The book may be important and with good sales but soon outdated, in which case a new edition is generally prepared, and the old stock disposed of by one means or another. In the case of such a volume as Cain's Foundations, after a lapse of 27 years since its date of publication, sufficient demand has arisen apparently from a new generation of students of plant geography to necessitate the offering again in the form of a reprint edition of the original

printing. Reprinting of the old classical texts is a great benefit to science and to individuals who need these books. How much time do some of us waste in searching the shelves of the second hand book store (antiquariat) or the pages of book catalogs in an effort to locate some useful book for the institutional or our own library. And if it is a book in high demand, almost invariably it seems that an order is received too late; some one a little faster has already seen the book and purchased it. The present volume is basic to the field with definitions and concepts stated succinctly and accurately. There are five parts: the introduction; paleoecology; areo-geography (that portion of geography which deals specifically with area); evolution and plant geography; and the significance of polyploidy in plant geography. (Polyploids with new characters and new requirements from the habitat tend to migrate to areas where they are more suited, thus distribution geographically is an important factor in the evolution and development of species). The text is followed by a useful glossary, a bibliography (covering the entire volume), and the mixed index.

GMH

Notes bibliographiques: répertoire cumulatif, Séries 1 à 71, 1946-1968, by Roger Calcoen, 207 pp., Editions Culture et Civilisation, 115, avenue Gabriel Lebon, 1160 Bruxelles, Belgium. \$19.00

In this volume we find the re-publication in two alphabetical portions of various series of bibliographies on the history of science published by the Comité Belge d'Histoire des sciences. These include Series 1 to 66 in one alphabetical sequence and as a supplement, another alphabetic sequence with series 67 to 71. These bibliographic citations cover all fields of science and refer to contemporary publications. Each numbered citation includes the author or authors (or where it is a serial, the first word of the serial title is given) and the title of the work. If a book or pamphlet publication, the publisher and place of publication are given, year of publication, size of volume, number of pages, and mention if illustrated. If it is a journal publication, the name of the journal is given, followed by the volume, date, and page numbers. For most books and brochures, and occasionally for journal articles, there is given a reference to a review. In the case of co-authors, editors, etc., a cross-reference to other numbers is given; however, such cross-references are not numbered, hence the published numbers all refer to different books, articles, pamphlets, or journals. The total number of references for both the main part and the supplement is 5491. The numbered reference citations are followed by an author index, a person's index, and two subject indices, one in French, the other Flemish. Since Belgium is a bilingual country, the title page and the foreword (by Prof. J. Gillis) are in these two languages.

From a study of the first 100 references, publications were found originating from the USA, Netherlands, Spain, Turkey, Belgium, France, Germany, Switzerland, Luxembourg, Eire, England, Italy, Poland, and Sweden. Publication dates for these ranged from 1945 to 1965, paralleling the dates of the 66 series. The following fields of science were included in the first century of citations: general science, mathematics, astronomy, medicine, biology, zoology, botany, geology (and other earth sciences), military science, pharmacy, anthropology, archeology, agriculture, geography, food science, natural history, anatomy, and physiology. The greatest emphasis is of course on publications of the Low Countries - viz. Benelux. This is an important bibliographic treasury.

GMH

"WILDFLOWER TRAILS OF THE PACIFIC NORTHWEST" by Art Chipman, III + 156 pp., 236 col. pls., 1 portrait (dust cover), Pine Cone Publishers, 2251 Ross Lane, Medford, Oregon 97501. 1970. \$15.00.

From the title, one might conceive that flowering plants found along certain specific "nature trails" are referred to: this is not the case, the reference being to trails in a general sense. The plants are arranged in the order of the vernacular family names (Arum family to Water plantain family). Included are 236 taxa representative of 49 plant families. The taxa include both species and varieties. Under each taxon are given the botanical origin, vernacular name or names, family (common name), a brief description in popular language, the origin of the name, and uses made of the plant. The emphasis throughout has been on the family name, which is repeatedly used - in the page heading, family heading, under the species description, and in the figures. The area covered includes Washington, Oregon, Idaho, and British Columbia (Canada). Of course all the best known plants are here (Oregon grape, wild ginger, baneberry, columbine, larkspur, buttercups, prickly pear, dogbane, fireweed, mullen) as well as the less known. The colored figures are generally excellent, based on Kodachrome photos. This manual should be very helpful for the amateur interested in identifying the various flowering plants of the western area. The book is bound with a good index.

GMH

"THE ANNALS OF ABSTRACTING, 1665-1970" by Robert Collison (Editor), v, 54 pp.; School of Library Service & the University Library, Univ. Calif., Los Angeles, Cal. 90024. 1971. \$2.00.

This represents a compilation of abstracting organs, starting with the *Journal des Scavans* (1665-) and ending with "Bulletin of peace proposals" (1970-). There are notes on predecessors and successors for many of the titles, publishing authority, etc. A terminal index with many cross-references makes the contents more accessible. - About 700 abstracting titles are shown. - Omissions: "International Pharmaceutical Abstracts" (c. 1965-) and "Pharmaceutical Abstracts" (Austin, Texas; 1957-1969). "Excerpta Botanica Sectio A" and "B" first appeared in 1959, not 1955 as stated.

GMH

"THE LIFE OF PLANTS" by E.J.H. Corner (FRS; FLS), xii, 315 pp., 41 pls. (colored and uncolored), 103 text figs., The World Publishing Company, 2231 West 110th St., Cleveland 2, Ohio. 1964. \$12.50.

With a brilliant colored plate on the dust cover and with its many colored figures and line drawings inside, the present volume is bound to be attractive to an average person idly flicking the pages. A normal person, granted the time and opportunity, would be tempted to read passages here and there in the text and even to go on from there and read the entire book from the beginning. Samplings of the text would demonstrate how informing and interesting it really is. Let us consider only one passage (p. 35); which was selected at random: "The shore is a much more complicated place for plant life than the open sea. There can be no wonder therefore that plant life established on the shore has become vastly more complex. The vegetation that we see at the present day as the tide goes out is the consequence of the rivalry of seaweeds that has gone on for hundreds of millions of years. They have become extremely involved, just as forest consists of many kinds of plants intermingled: tall and short, annuals, perennials, and epiphytes (plants growing, but not parasitic, on others). Nevertheless, the seaweeds sort themselves according to the environmental factors in a way that illustrates their evolution.....The size of the seaweed indicates its store of protoplasm and measures, of course, its success as a plant growth; and from sizes of seaweeds the suitability of different parts of the shore for plant growth can be judged." This quotation will show what pleasant reading the book is: short simple words, short understandable sentences, the primary importance, hence interest, of the subject matter presented. - The arrangement of the book is a progressive one: it begins with the ocean and the life therein, proceeds to the land and follows the

upward course or evolution of land forms. On land, the flora of the moist forest is followed by that of the drier zones of plains and desert, on the one hand, and back to water - the fresh water habitats - on the other. - Included at the end of the book are: Glossary, 285-90; Bibliography, 291-303; and Index, 305-15.

GMH

Principes amers à fonction lactone. (Bitter principles with lactone function) by Jacques Couquelet, 70 pp., 5 tabs., 1 fig., Mimeographed (or multigraphed), No other bibliographic data available. 1967 (March)

A review of many different plant principles, with structural formulas, uses, and botanical origins particularly stressed. There is some discussion of the physiology of taste. Among the groups recognized and taken up are the bitters of the sesquiterpenes, diterpenes, limonoids, meliacins, and cucurbitacins. 163 references.

GMH

"PHLOEM TRANSPORT IN PLANTS" by Alden S. Crafts and Carl E. Crisp, xxii + 481 pp., 64 figs., 54 tabs., W.H. Freeman & Company, 660 Market Str., San Francisco, Calif. 94104. 1971. \$12.50

The text of this attractive book represents a study of translocation or transport of materials occurring in the phloem or bast of the plant axis. These substances include minerals (inorganic substances), water, organic foods (sugars both monosaccharides and oligosaccharides, sugar alkaloids, sugar phosphates, organic phosphates, amino acids, nucleic acids, vitamins, etc.), hormones (growth regulation substances including steroids), viruses, enzymes, and agricultural chemicals (including pesticides and "chemotherapeutants"). This movement or migration of substances in the plant is important to the other processes of the plant, especially those affecting reproduction and growth. Thus, sap movement is directly or indirectly involved in the operations of expansion, flowering, fruiting, dormancy, rejuvenation, and senescence. The direction of flow of chief importance is from the green chlorophyll-bearing tissues to the non-green tissues (from "source to sink"). Translocation in the xylem, chiefly concerned with water and minerals conduction, is not discussed in this volume. Previously, movements of the solution in the sieve tubes was conceived as a mass flow; now it is quite clearly shown that this is actually an oversimplification and that movement of the stream is essentially a rapid diffusion through plasma membranes from cell to cell via the plasmodesmata. This is called the "symplast-apoplast concept", the symplast representing the protoplasmic continuum with no isolated cells and the apoplast

representing the non-living but permeable cell wall which surrounds the symplast. This viewpoint has been developed over the past few years. In fact, so rapid is the advance of work in this field, that advances over only the last decade are featured in this book. Many of the new findings depend on the use of the electron microscope, which demonstrates for instance that the sieve tube pores actually represent smooth microtubules lined by a thin layer of plasmolemma. (The figure on the dust cover is a blow-up of Figure 2.10, showing a sieve plate in cross section with open pores). The volume text is broken into 3 parts: (1) Structure-functional relationships (88 pp.); (2) Experimental results (review of recent work of many researchers (183 pp.)); (3) Translocation mechanism (149 pp.). - The senior author has been very fruitful in the research area, with the authorship of at least two other technical books, parts of several more volumes, and many scientific papers. Proofreading was occasionally imperfect with 2 errors in the Preface and one in the introduction (Chapt. I).

GMH

"THE TREES OF SOUTH FLORIDA. VOLUME I. THE NATURAL ENVIRONMENTS AND THEIR SUCCESSION" by F.C. Craighead, Sr., xiv, 212 pp., 92 figs. (photos), 7 maps and charts, Univ. Miami Press, Coral Gables, Fla. 1971. \$5.95.

In this first volume of a set of two, the physical environment (climate, geology, physiography, etc.) is discussed as related to tree growth and distribution in the southernmost part of the State of Florida (covering Collier, Dade, and Monroe Counties). Most of this area is off the beaten trail and visited by very few persons. The author, however, has thoroughly traversed this region for more than 20 years and with his long career in forestry and entomology as background, is most competent to write about this area. The last of the three chapters occupies more than half the text and is devoted to the nine physiographic provinces of the area and their plant associations: Kays; Florida Bay; Saline Mangrove Zone; freshwater swamps; pineland ridge; low pineland and sloughs; tree island everglades; hammock and cypress ridge; Big Cypress Swamp. Additional to the text proper there are a glossary, "selected" references, index to common and scientific names, (really a glossary with many local names included), and the general index. Much of the text is pertinent to the problem of pollution and man's interference with natural environments and this text will therefore be of much service to those individuals and organizations interested in the modern problems of Ecology. - The term "periphyton" is not defined in the text, the glossary, or the index to common names.

GMH

"THE EVOLUTION AND CLASSIFICATION OF FLOWERING PLANTS" by Arthur Cronquist, xi + 396 pp., 28 figs., (Riverside Studies in Biology). - Houghton Mifflin Company, Boston, Massachusetts. 1968. \$6.95.

In an Introduction, W.C. Steere (Director, N.Y. Botanical Garden) points out that this book presents a clear and orderly summation of the basic principles of modern taxonomy and is the only work with the essential information presented in systematic order (botanical arrangement in the form of clear synoptical keys.) There are chapters on taxonomic principles; origin of the angiosperms; evolution of characters; the subclasses, orders, and families of dicotyledons and of monocotyledons; with a final listing of classes, subclasses, orders, and families of "Magnoliophyta" (here applied as a phylum or division name equivalent to Dicotyledoneae; the term does not appear in the index and does not seem to be used elsewhere in the text). Magnoliophyta is made up of Magnoliatae (dicots) and Liliatae (monocots); under it appears Magnoliidae as a sub-class and under this order Magnoliales and fam. Magnoliaceae. Cronquist's treatment of taxonomic groups is conservative, that is, he is classed among the so-called "lumpers", who as far as possible reduce species to lower categories, such as subspecies, varieties, etc. However, he shows some "liberal" tendencies as in the placing of Rubiaceae and Caprifoliaceae in separate orders (cf. V.L. Harms, Econ. Bot. 23: 294-5; 1969). This is an important text in plant study.

GMH

"LEWIS AND CLARK: PIONEERING NATURALISTS" by Paul Russell Cutright, xvi + 506 pp., 16 pls., 2 figs., 1 map, The University of Illinois Press, Urbana, Ill. 61801. 1969. \$12.50

Far from being a cut and dried account of the Lewis and Clark western expedition from the standpoint of the botanical and zoological accomplishments made, this book combines an interesting narrative with really important information on the various scientific accomplishments of the mission. One of the most valuable features of the work is the summation of findings and accomplishments of the expedition, and the analytical study of the records, features which are sprinkled throughout the volume. Thus, for instance, one will find a list of the technical botanical terms used by Meriwether Lewis while describing the plants just at one location, Fort Clatsop (p. 258). As another example, at the end of the account is an effort to determine the fate of the various expedition members several years after this great journey - (p. 346). Such analytical summations of the records are very helpful from several viewpoints. One difficulty in reading the text, particularly in reference consultation, is to determine the dates

of particular findings or events. This is often the case in biographical and historical accounts. It would be most helpful if dates (year, month, day) were printed at the head of each page. Unfortunately it is not often done; in consequence it takes quite a bit of searching sometimes to find just when this or that took place. Another "would-have-been" help in the book would have been several maps, for the entire journey and for segments of it. The single map used is small and only shows a part of the route covering only three days of travel. The first collection of Rhamnus purshiana is mentioned without fanfare, as though it were just another wild plant. Some idea of its current importance (and for the last century as source of the important crude drug, Cascara Sagrada, now used extensively all around the world and still largely obtained from the Pacific coast areas of the United States, should have been given; several million pounds of this bark are produced annually. A considerable part of the botanical content will be found in the chapter "The fate of the Lewis and Clark booty." (pp. 356-375). In this chapter is recounted the sad story of lack of forethought, lack of conservation of the resources collected so arduously and at such cost by the Expedition. Many of the zoological and ethnological specimens like many of the botanical specimens have been left erode to dust.

GMH

"HOW TO KNOW THE CACTI - PICTURED KEYS FOR DETERMINING THE NATIVE CACTI OF THE UNITED STATES AND MANY OF THE INTRODUCED SPECIES" by E.Y. Dawson, VI, 158 pp., 183 figs., Wm. C. Brown Company, Publishers, 135 S. Locust St., Dubuque, Iowa, USA. 1963. Spiral binding \$2.25; cloth bound, \$2.75

Like other volumes in this "How to Know" series, the text consists of a single long key, with a short description and a figure of nearly every species. Another common feature is the Index and Pictured-Glossary, which serves both to indicate page locations of the various species in the text and also to define technical terms in words and figures. An introductory section discusses the cacti (Fam. Cactaceae) as a New World family, with general information on geographical distribution, identifying characteristics, preparation of specimens, and morphology. While this volume is gaited for the layman, it would undoubtedly be useful too for professional botanists and others. The spiral binding is a very handy device for field use, because it avoids the aggravations consequent to holding a place in a book while both hands are occupied (with plants and instruments in this case).

GMH

"THE LANGUAGE OF BOTANY" by C. Debenham, iv, 208 pp., 36 pls., Society for Growing Australian Plants, 860 Henry Lawson Drive, Picnic Point, N. S.W., Australia. c. 1971. \$2.80.

Apparently all fields of botany are included in this dictionary; thus, terms in taxonomy, plant physiology, histology, morphology, genetics, phytochemistry, plant biochemistry, microscopy, plant ecology, phytogeography, and other fields are noted. It is without question the most recent English dictionary in the field and in some respects would appear to be one of the most useful, modest as it is in appearance with its limp composition cover and low price. It includes many Latin and Greek words which are used either as regular terms in modern science or as roots to compound words. Many excellent line drawings and diagrams furnish important guidance in morphology, life cycles, taxonomy, and biochemistry. The pages are rather crowded and there is enough text to provide a volume of ca. 400 pages of ordinary type. The definitions seem to be clear and accurate. (One error: p. 117: hypogenous for hypogonous).

GMH

"CAVEAT EMPTOR" by O. Degener, Newsletter 4 (7): 1-4, Hawaiian Bot. Gardens Foundation. 1970.

The plan of establishing a National Park on Hawaii (Hendrix, G.O., "The Island of Hawaii." A resource study and master plan; 103 pp.; 1970) is criticized. This Park would duplicate other volcanic areas with aa, pahoehoe lava, ash, cinders, and clinkers. It would be preferable to preserve the lush jungle areas of Hawaii which stand in need of conservation since they contain many plants which are not found elsewhere and will be lost in the course of time with the attempts at "improvement," commercialization, and pollution going on in the Hawaiian Islands. It is most important that the cloudbelt forests be conserved; these are of little commercial or agricultural value. The plan to build a super-highway is also condemned.

GMH

"AN ILLUSTRATED TAXONOMY MANUAL OF WEED SEEDS" by R.J. Delorit, 175 pp., 192 col. pls., several text figs., Agronomy Publications, River Falls, Wisc. 54022. 1970.

This manual which conveniently opens at any page spread by reason of the spiral binding should provide a useful means for the identification of the commonest weed seeds of the United States. However, since weeds are so widely dispersed in the world at large, the book might prove useful in almost any part of the temperate zone which has undergone any intercourse with the other parts of the world. The classification is based on morphological characters of superficial type. Thus, all seeds are placed into one of three large classes, based on the

apical nature of the seed or the general shape of seed. The color photographs are very effective, showing the seeds magnified 3.6 or 5.8 times. A rather complete description of each seed is given where it appears in the key. There are indexes, a glossary, and introductory information listing all the seeds in alphabetic order by fam. and explaining the use of the key. This book should provide a very handy and effective guide to the botanist, seedman, farmer, and others.

GMH

"FLORA OF THE SEA" by C.L. Duddington, 207 pp., 26 pls., 33 figs., 1 col. frontispiece, Thomas Y. Crowell Co., 203 Park Avenue South, New York, N.Y. 10003. 1967 (copyrighted 1966). $5\frac{1}{2} \times 8\frac{1}{2}$ in. \$6.95.

In this attractive volume, with its fine photographs and line drawings, we have another weapon in our struggle against those who would selfishly destroy our great natural environment. Those who are aware of the great intricacy and balance of the organic world as well as of its great importance to our human society and its compelling beauty, would surely not knowingly do anything destructive of it. In its fifteen chapters, there is unfolded the great drama of life in the sea. The story unfolds in this way: in Chapter 1, a general account is given of the Algae: Ch. 2 deals with Spirogyra and related algae (sometimes referred to picturesquely as "mermaids' tresses"), and good examples of the group; in Ch. 3, the nucleus and its function are described. The Green Algae (Chlorophyceae) are taken up in Ch. 5; the lichens are discussed in Ch. 6 from the standpoint of their algal component; Ch. 7 deals with organisms in the twilight borderland which separates animals from plants; in Ch. 8, the diatoms are dealt with in a general way. The next four chapters deal with four of the chief algal groups: 9, the Pyrrophyta (=Dinophyceae = Dinoflagellata); 10, Phaeophyta (brown algae); 11, Rhodophyta (red algae); and 12, Cyanophyta (the blue green algae). The life story of the Algae comes up for discussion in the 13th Ch. The effect of environmental differences on Algae is discussed in the next chapter, representing the ecological treatment. The last Chapter deals with the economic values and on the applications of Algae to human needs. Finally, there are a Glossary and Index. - Plate 12 shows a centric diatom (or wheel diatom), the generic name *Arachnodiscus* being mis-spelled. - This book was published under a different title in Great Britain: "Seaweeds and other Algae." - The author is an Englishman who has written other works in the field of microbiology.

GMH

"PRELUDE TO THE POLYCLAVE" by J.A. Duke, I. Embryo, 34 pp.,
II. Seed, 22 pp., III. Sterile Specimen, 42 pp.,
IV. Flower, 32 pp. - Prelude to a palm polyclave;
Panama, 18 pp. (I: 8½ x 11 in.; others 8½ x 14 in.)
- Legume polyclave. I. Habit., 4 pp. 1966. \$17.10.

A polyclave (multiple key) is an information retrieval system and is defined by the author as a "coordinated characteristic index designed primarily for the identification of unknowns." Two kinds of data cards are used: (1) red positives intended to indicate the fams. which have the characters noted; (2) black negative to indicate the fams. not possessing the particular characters. While these are published on paper, in the final edition, negative sheets are to be printed as transparencies; by superimposing the negative transparencies over the paper positive, it will be possible to distinguish those genera with a certain character, thus to permit rapid identification. (Address: Interoceanic Canal Survey, Gorgas Hospital, Balboa Heights, Canal Zone) (Price of these sets \$17.10. Transperencies have a higher cost).

GMH

"BASIC BIOLOGY" by Alfred M. Elliott and Bruce R. Voeller, xii + 653 pp., many figs. and tabs., 17 col. pls., Appleton-Century-Crofts, Div. of Meredith Corp., 440 Park Ave. So., New York, NY 10016. 1970. \$10.95.

In this attractive modern text on biology, the student will find the covers colorfully illustrated with plant tissues which appear to represent some kind of filamentous alga. Hopefully this kind of decoration will stimulate the student to open the book ("crack the book" as the American slang goes) and study the even more interesting contents. The text has been printed in an unusual combination of two colors, a dark bluish green, and a reddish brown. Plants are chiefly discussed on 113 pages out of 581 text pages in the main body of the book; however, aside from this total treatment, plants are discussed in the general biology sections when "the organism" could be either plant or animal. Specific animal coverage, including that for man (animal physiology), covers 227 pages, roughly twice as much space as for plants. Without question, to beginners animals are of more interest than the apathetic plant, hence greater emphasis on animals would seem to be justified. At the ends of the chapters, there are book and article references, with greater emphasis, wherever that is possible, on the less technical literary materials. Many of the articles are from Scientific American, one of the most successful organs for the popularization of science. Several "service" sections occur at the end of the book: a classification scheme for plants and animals, a glossary of technical terms, and the index. Thorough and conscientious study of this book should serve to confer a good

background of modern physiology on the undergraduate college student or serious layman. It is well presented - all that it needs is the absorptive capability of the student.

GMH

"JOHN BANISTER AND HIS NATURAL HISTORY OF VIRGINIA, 1678-1692," by Joseph and Nesta Ewan, xxx + 487 pp., 69 figs., 1 map, 1 portr. (dust cover), University of Illinois Press, Urbana, Ill. 61801. 1970. \$15.00.

The life of this rather obscure man is covered in the presented volume in a span of only 68 pages, running from the time of his birth in 1650 in Gloucestershire, England, to his untimely death at 42 years of age, when apparently shot by accident by another member of his exploratory party. (pp.26-93). Most of this brief account is concerned with the most productive years of his life - the scant 14 years he lived in the New World. The balance of 437 pages is devoted to the fruits of his short life - his written works, collections, correspondence, drawings, and plans. Considerable attention is also given to his contemporaries. (The manner of his death is apparently still a matter of controversy, since for example, Lemmon in his recent "Golden Age of Plant Hunters" (1968), gives a fall from a rock as the cause of the tragedy). The author has added to the intrinsic interest of the subject by the insertion of numerous charts and "exhibits" throughout the text. A great wealth of information is made available in the pages of this book. - The work is divided into two parts, the first concerned with biographical details, including Banister's coming to the New World as an Anglican minister (not really as a missionary to the Indians as sometimes claimed), the fate which befell his estate including his various labors, the various books known or supposed to have been his, etc. Part Two publishes his various works, including the "Plant Catalogue," "Insect and Arachnid Catalogue," "Mollusca, Fossils, and Stones," the "General Natural History," and his account "Of the Natives", with a bibliography, indexes to the various plants and animals as well as the general index. The latter is defective in places, for instance the account "Of the Natives" (pp. 372-401) could not be located through the index, either under Banister or the title; likewise the "Natural History" (pp. 345-372) and the "Plant Catalogue" and other catalogues are lost as far as the index goes. They should certainly have been shown. The translation could have been improved (simplified) by using the equivalent of "ye," which of course is "the" and which was intended. The legend of Fig. 1 is inadequate, since this is a composite figure of 6 plants, only one of which is Camptosorus rhizophyllus (fern). (This is not indexed in the Index of plants and animals.) The religious beliefs of this minister make for interesting reading. He apparently was a liberal, a follower of Socino (in his Oxford student days) who

at times refers to the "pious frauds" (ritual) of some churches of his time. A noteworthy biography! (Minor Errata: Page 34, line 8: the date should have been 1677 not 1697. P. 64, line 16: Dauphiné is correct).

GMH

"EDIBLE WILD PLANTS OF EASTERN NORTH AMERICA" by Merritt Lyndon Fernald and Alfred Charles Kinsey, XV, 452 pp., 25 pls., 129 figs., Revised by Reed C. Rollins, Harper & Row Publishers, New York, N.Y. and Evanston, Ill. 1958 (1943). \$6.95.

The two original authors of this important text are both no longer with us, but the task of revision has been done by a man who has carried on in the footsteps of the senior author, as Director of the Gray Herbarium at Harvard University. The text is correctly described as "a complete, illustrated guide for the United States and Canada east of the Great Plains." One might raise his eyebrows at the word "complete," however, nothing is complete in this world, not even when a book comes fresh from the press and so one might allow a little tolerance in the use of the word. Perhaps accuracy would have been served by calling it the most complete popular text on the market, if one considers for a moment Sturtevant's "Notes on edible plants" (1919).

This volume has five chief divisions ("chapters") following introduction and preface: Chapter I deals with the food plants arranged in accordance with the particular food use desired (soups; potherbs; beverages; syrups; etc.). Chapter II deals with poisonous plants which may be mistaken for edible ones. Chapter III is a detailed enumeration and discussion of edible plants. Chapter IV has to do with mushrooms, seaweeds, and lichens as food, in other words cryptogams, not all of which are considered especially desirable. Chapter V is the Bibliography-index.

GMH

"A STORY OF NORTH AMERICAN FORESTRY. BERNHARD EDUARD FERNOW," by Andrew Denny Rodgers, III, IX + 623 pp., 6 portr., (Facsimile of the 1951 edition), Hafner Publishing Co., 31 E. 10th St., New York 10003. 1968 (1951). \$11.00.

In this biography of the "creator of modern forestry in the United States," the life of the man and the history of American forestry are closely interwoven to produce a pattern of progress, development, and evolution. The combination is so close that in fact one often has difficulty in working out the vital facts of the biographee's life. An important change may be found often in the midst of a paragraph dealing mainly with developments in the science of forestry. A very useful feature

in such a work would be particularly useful to the reader because there are no references to him in the index. Such a chronology might go as follows:

- 1851 - born in Prussia
- 1869 - began the study of forestry
- 1876 - became engaged to an American girl visitor to Germany, Olivia Reynolds
- 1877 - took out his first American citizenship papers
- 1878 - married the girl in New York
- 1880 - practicing mining engineering but becoming increasingly active in forestry matters
- 1886 - appointed Chief, Forestry Division, U.S. Department of Agriculture
- 1898-1903 - Dean of Forestry school, Cornell University
- 1899 - took trip with others interested in forestry to Pacific northwest
- 1903-1907 - engaged in literary work (editing, writing, lecturing) and as consultant in forest engineering
- 1907 - teaching at Pennsylvania State College
- 1908 - appointed Dean of forestry school, University of Toronto (Canada)
- 1919 - retired from deanship; continued writing
- 1923 - died in Toronto

The volume is replete with data on many individuals previously active in forestry and botany.

GMH

"FLOWERS OF POINT REYES NATIONAL SEASHORE" by Roxana S. Ferris, vi, 119 pp., 1 map, 172 figs., Univ. Calif. Press, Berkeley and Los Angeles, Calif. 1970. Price US \$7.95; paper US \$2.65).

Semi-popular account of the attractive and outstanding taxa of Spermatophyta found in this area of the Pacific seacoast which lies about 30 miles north of San Francisco, California. In this compilation, 181 spp. occurring in twelve plant communities were selected, and briefly described and figured with pen sketches. The figs. are by Jean R. Janish; they are unusual in including for scale purposes, the figure of a "stick" man, rule, etc. As an aid to rapid identification of these plants, "color lists" are included in the front part of the volume, listing spp. with red, blue, yellow orange, and other colors of flower. There is also a brief discussion of the 12 plant associations found in the 53,000 acres of the Point Reyes Peninsula. Selected references and an index complete the volume. Both common and scientific names have been used, and the uses by Indians and others of various plants are described. The volume should be a very handy one for individuals of all ages in identifying the common plants of the region.

GMH

"ORCHIDACEAE" by E. Foldats, Vol. XV of Flora de Venezuela (directed by T. Lasser). Part 1: pp. 1-502, 188 figs.; 1969. Part 2: 1-523, 201 figs.; 1970. Part 3: 1-522, 185 figs.; 1970. Part 4: 1-558, 195 figs.; 1970. (Instituto Botanico, Min. Agric. y Cria, Caracas, Venezuela).

In this large work of the orchids, the family has been divided into two subfamilies, Cypripedioideae and subfamily Orchioideae, and into 5 tribes, the first tribe Cypripedieae of subfamily Cypripedioideae and the 4 others under subfamily Orchideae. Part 1 is concerned with all 5 tribes; in the case of subtribe 5, Epidendreae, subtribes Lipariinae, Polystachyinae, and the first part of Pleurothalliinae are taken up. In Part 2, this subtribe Pleurothalliinae is continued; in Part 3, the same subtribe is concluded, and subtribes Epidendriinae and Bletiinae are covered, and the first portion of Cyrtopodiinae is included. Part 4 completes the coverage of subtribe Cyrtopodiinae, and continues with subtribes Catasetinae, Stanhopeinae, Maxilariinae (including Zygopetalinae and Lycastinae), and Dendrobiinae. - Included in this monograph are descriptions (in Spanish) of the family, genera, and species, keys for some genera, synonymy, detailed distribution data, discussions, and the line drawings of most species. About 1,000 species are included. Apparently there are no novelties.

GMH

"KLEINE KRYPTOGENFLORA. BAND III. FLECHTEN (LICHENES) VON H. GAMS" VIII, 244pp., 84 figs., format 12.7 X 21 cm., plastic binding, Gustav Fischer Verlag, Postfach 431, * 7 Stuttgart 1, Ger. 1967. DM. 28 (US \$7.00).

In the introductory part there are given a list of lichen specialists (with abbreviations), vegetative, generative, and ecological terminology, important lichen substances and color reactions, keys to the fungal components, algal, and chief groups. Beginning on p. 13 is the chief part of the text, with a combination of key arrangement with specific brief descriptive texts. As in earlier parts of this series, all Europe is included in the coverage. 2 classes are recognized: Ascolichenes (much the larger) and Basidiolichenes. Although there are no novelties, the author has introduced a number of changes from current treatment of the lichens. There is a genus index. This volume will be of special interest to botanists, plant geographers, forest specialists, college teachers, botanical institutes, and the libraries serving these persons.

*Available in the US and Canada from: Intercontinental Medical Book Corporation, 381 Park Ave. South, New York, N.Y. 10016.

GMH

"PATHOGENIC ROOT-INFECTING FUNGI" by S.D. Garrett, xi + 294 pp., 25 figs., 14 tabs., Cambridge University Press, Amer. Branch, New York. 1970. \$12.50

This book can be regarded as either a sequel to or a replacement of a previous work by the same author, viz., "Biology of root-infecting Fungi" (1956, 1960). Instead of re-working the first edition, the author decided to compose an entirely new book because of the many important advances in our knowledge of these fungal forms. The work is written for regular reading, preferably chapter by chapter, rather than for occasional reference use. Nevertheless it does have important reference values, when one considers the extensive bibliography (27 pages) and the rather full subject index (12 pages). Interest in the text focuses on both biological phenomena and economic importance associated with the functioning of these organisms. An important value in the work is a broad view of the plant as a whole to the soil as a whole rather than simply the relationship of root system to fungal organism. Following the introduction, there are successive chapters on "unspecialized" parasites of both seed plants and older plants; specialized parasites (1) vascular wild fungi; and (2) ectotrophic root-infecting fungi; root-infecting fungi which survive by colonization of substrates also utilized by higher plants, and thus termed "competitive saprophytic colonization"; survival of such fungi in infected or colonized host tissues; dormant survival by resting propagules (dispersal spores, resting spores, chlamydospores, sclerotia) of similar fungi; and control of root-disease of field, intensive, and plantation crops. (One might correctly expect little mention of mycorrhizae since these are non-pathogens; they are mentioned only incidentally on a few pages. The author suggests (p. 81) that the mycorrhizal fungi have evolved from specialized root pathogens.) Throughout the text, examples of the organisms concerned are constantly cited, and often several pages will be devoted to considering the anatomy and physiological behavior of such an organism, often as related to methods of practical control of infection. - This work should be of much value to plant pathologists, mycologists, agronomists, and others in the field of applied botany.

GMH

"AN ILLUSTRATED STUDY GUIDE TO PLANT BIOLOGY" ed. 2, by J.W. Geis and J.L. Morrison, V + 145 pp., 138 figs., 21 tabs., Burgess Publishing Co., 425 South 6th St., Minneapolis, Minn. 55415. 1971. \$4.95.

The text is divided into 14 units intended to cover 14 weeks of study, which in American academic institutions amounts to one semester (two semesters per year). Each unit is made up of descriptive texts with accompanying illustrations (both line drawings and photographs, mostly photomicrographs), along with

spaces for the student to fill in with writing or sketches. Experimental work is detailed and spaces are left for the findings from this; tables and graphs are also provided to be filled in. The text involves morphology, histology, physiology, embryology, chemistry, biochemistry, taxonomy, genetics, economic botany, and ecology. (Coverage of chapters: unity and diversity in living world; plant body; cell; growth and development; meristems and tissue origins; secondary development of stems; plant-soil system; plant-water relationships; photosynthesis; plant metabolism; flower and gametogenesis; genetics; plant diversity; plant ecology). The authors have used a 5-kingdom classification scheme based on one by Whitaker (1969), including Mineralia, Protista, Fungi, Plantae, and Animalia. This guide is intended for first year botany and is best adapted to the semester rather than the quarter system. It is best used by the "auto-tutorial" method that is becoming so popular in the U.S.A. but it can easily be adapted to the ordinary old-fashioned course in botany (with conventional lecture, laboratory, and examination).

GMH

Excerpt from ILLUSTRATED DICTIONARY OF BOTANIC TERMS" by John Lindley (1848). - Reprint (with some changes) of reprint of 1938. J.J. Graham, (Ed.), 48 pp., many figs., School of Earth Sciences, Stanford Univ., Stanford, Calif. 1964. \$1.25.

The pamphlet cited represents a reprinting of part of Book III of Lindley's Introduction to Botany, covering pp. 346-83, plus p. 319 of Book I, preceded by a few notes on the book and its author. The clear cut definitions for terms relating to form, outline, margin, etc., are still useful and applicable to living and also fossil plants.

GMH

"MUSHROOMS OF THE GREAT LAKES REGION" by Verne Ovid Graham, vii + 489 pp., 49 pls., Dover Publications, Inc., New York City. 1970 (1944). 5-3/8 x 8 1/2 in., paper bound; \$4.50. (US)

It was an excellent idea to reprint this volume. It represents a good thorough treatment of the higher fungi of the central United States and eastern Canada, and beyond that it is very useful in other parts of North America since so many of the Ascomycetes and Basidiomycetes treated occur widely all over the continent (except perhaps for the frigid northern regions). The keys, descriptive texts, and figures are nicely balanced, and there are many common names (which unfortunately are not indexed in the index at the back of the text), often a help in identification, or at least a short cut to the approximate position of the organism. The book is abundantly provided with diagnostic keys, the first one being the important key to genera.

a sub-title indicates the coverage geographically to be Illinois, Indiana, Ohio, and the southern half of Wisconsin and Michigan. Included are not only the Basidiomycetes but also some of the larger and more prominent Ascomycetes. A glossary ("Dictionary") of technical terms is useful, especially when supplemented by plates 12 and 49. As usual, the book is printed on strong durable paper in a clear type face, the paper in signatures, and the volume strongly bound.

GMH

"DRUGS AND PHARMACY ON STAMPS" by George Griffenhagen, R. PH., M.S. - ATA Medical Handbook series, v. 2: 95 pp., 21 pls., (Available from American Topical Assn., 3306 N. 50th St., Milwaukee, Wisc. 53216.) (ATA Handbook No. 55). 1967. \$5.00.

The cover of this brochure communicates the subject matter: the four traditional signs of pharmacy (RX sign; show bottle of colored water; cup of Hygieia; mortar and pestle) as background for a sampling of postage stamps on pharmaceutical subject matters. In this Topical Handbook it seems reasonably certain that all of the postal stamps which have anything to do with pharmacy or drugs have been included, representing a survey of all stamps issued starting with the first adhesive stamps of England (1840) up to the year 1966 and for all countries of the world plus the United Nations. The subject matter is laid out in the following pattern: Introduction; Pharmacopoeia Philatelica (drugs on stamps); pharmacological-therapeutic classification of drugs represented on stamps, including a glossary of technical terms used (thus, under digestants, only 1 drug, Papain, is represented); a listing of the drugs (mostly crude drugs, but with a few inorganic and organic compounds), with detailed commentary on each one and a list of all stamps bearing the drug; index by countries (thus, for Guatemala, only coffee (caffeine) is listed); drug name index (this refers to the previous listing, each item of which has a coded number); drug dosage forms and sources (rather a miscellaneous group, for instance, with pictures of administration of medicine, pharmaceutical equipment, pharmacy congresses, etc.); personalities of pharmacy (by Henryk Szancer) (alphabetical listing with biographical sketch and stamps which have commemorated the person); private die proprietary medicine stamps (Varro E. Tyler) (these are privately printed stamps used to indicate payment of the federal excise tax on proprietaries, 1862-83); drug advertising and postage stamps (involving the use of framed postage stamps used for small change during the Civil War, with advertising on the back of the case and other devices); and finally the annotated Bibliography. - At first thought, the price of this volume might appear to be high; however, it is undoubtedly priceless to the serious topical philatelist. The volume is truly a work of love and devotion to a scholarly hobby - the science of philately.

GMH

Printed books, 1481-1900, in the Horticultural Society (Library) of New York, by Elizabeth Cornelia Hall, compiler, xiii, 279 pp., 1 pl., The Horticultural Society of New York, 128 W. 58th St., New York 10019. 1970 (recd. 1972) \$16.00.

An alphabetic listing of ca. 4,000 volumes of botanical and horticultural printed matter including facsimiles and reissues. A reference listing (pp. 243-79) of books is appended with classification into various subjects. The citations are "short-title", that is, very brief without further definition of contents beyond the author name or names and essential words of title with place and date of publication. All other bibliographic data have been omitted. There are entries also under periodical titles, institutions, and also cross-references to authors when there are more than one. Works in all fields of botany and of horticulture are included. Five incunabula are among the items inventoried, including the Herbarium of Apuleius Barbarus (ca. 1483).

GMH

"HUMAN POISONING FROM NATIVE AND CULTIVATED PLANTS" by James W. Hardin and Jay M. Arena, x + 167 pp., 55 figs., Duke University Press, Durham, No. Carolina. 1969. \$6.00.

In this thin volume, the authors - one a professor of botany, the other a medical professor - have told the story in simple and direct language of the dangers of poisoning from plants which occur in the North American continent. However, many or even perhaps a majority of the plants discussed are found on other continents - either as the same species or as one or more closely related species. The book is well written, accurate as far as could be noted from sample readings, and very attractive to the ordinary reader - with a clean appearing format, good illustrations, both line and halftone, well organized and arranged, and with a good list of references and a detailed terminal index. What more could one ask from a book of this type? Early in the volume is a listing of dangerous plants arranged under wild growing and cultivated types; the first chapter after the introduction takes up the very important allergenic plants, which are not regarded as truly poisonous plants in the sense of heart or respiratory poison materials, etc. The next chapter deals with dermatitis, then follows one on internal poisoning, and the last is I suppose rather unique - "poisoning of pets". In view of the popularity of cats and dogs, this should be an important attraction for readers. There is a good glossary with many figures to illustrate terminology. The plants are arranged by family, following the Englerian order.

GMH

"TEXTBOOK OF DENDROLOGY covering the important forest trees of the United States and Canada," by W.M. Harlow and E.S. Harrar, Ed. 5: xv + 512 pp., 221 figs., 68 pls., many tabs., col. frontispiece, McGraw Hill Book Co., New York, London, Sydney, etc. 1968.

In this well-bound handsome volume, a standard work has reappeared to continue its service as a useful and accurate textbook and reference work on the important trees of the forest. The authors are well known professor and dean (respectively) both now in emeritus status. Many important features of identification, distribution, and silvics (forestry data) of about 150 American commercial timber species are presented. Among the new additions is a section on dendrochronology or the calculation of date in recent times (the last few thousand years) by means of a study of the wood rings. - Typically, for each tree, the following information is given: accepted botanical name (with authority), common English (American) name; botanical features of the tree; general description of the plant, including its habitat, preferred soils, uses, etc.; range (with maps); etc. An introductory section covers the general principles of botany as far as they apply to a study of trees, and this is followed by the systematic portion - the Gymnosperms (pp. 45-212) and the Angiosperms (pp. 213-453). Follow a glossary, a list of the official "state trees" of the U.S.A. (i.e., tree species voted by state legislatures as the most popular tree; for example, since 1949, Alabama's state tree is the southern pine, Pinus species); the derivations of some scientific names; a synopsis of important references (31 references); a listing of "selected" references (394 items); and the index. - It is surprising how many of the trees included are of drug use: among some noted were the pines, sassafras, sweet gum, witchhazel, wild cherry, basswood, and others. However, uses of the trees are only casually mentioned at most.

GMH

"WESTERN EDIBLE WILD PLANTS" ed. 1, by H.D. Harrington, vii, 156 pp., 62 figs., Univ. of New Mexico Press, Albuquerque, N.M. 1972. \$2.95.

Presented in this paper-back book is a quasi-popular account of the food plants of the western USA, along with a chapter (4) on the toxic plants of the area. Altogether, the volume takes up 42 plant species, of which 37 are food sources and 5 are poisonous non-food plants. The figures are all line drawings except for the colored plate on the cover which illustrates Nuphar polysepala, the cow lily. The covered area extends from w. Nebraska and w. Kansas n. to South Dakota (Black Hills) w. to Washington s. to s. California and e. to New Mexico. The book has considerable original material and is based primarily on the author's own experiments and experiences.

GMH

"KNOW YOUR GARDEN SERIES: TREES AND SHRUBS" by Richmond E. Harrison and Charles R. Harrison, 199 pp., 582 col. pls., Charles E. Tuttle Co., Publishers, Rutland (title page error for Rutland), Vermont and Tokyo, Japan. (copyright 1965). \$12.50 (Yen 4,500).

This attractive volume is a "colour companion" to R.E. Harrison's "Handbook of trees and shrubs for the southern hemisphere". It is essentially an album of colored pictures of cultivated trees and shrubs of southern Australia and of New Zealand; there is a text (of 38 pages) separate from the plates which is chiefly concerned with general statements about cultivation, taking photographs, etc., or general information about important genera of the plants considered. The plants are arranged in the plate section in the alphabetical order of their botanical names (i.e., the genus). For each figure important information is given: the botanical name, common name (in many cases), height of plant as ordinarily seen in cultivations, brief description, and hardiness. An index of 7 pages terminates the volume, with both common and scientific names listed. The attractive colored illustrations are the chief value of the book, and it provides a convenient way to recognize many plants by riffling through the plate section. All the photographs were taken (Kodachromes) in New Zealand where the authors live. The plates are numbered and likewise the pages bearing the plates, so that locating a plate from the index is simply accomplished. While the emphasis is on plants of Australasia, the book also definitely applies to other southern Hemisphere locations, such as South Africa and southern South America. The authors, a father and son team, were successful in the horticultural business in North Palmerston, New Zealand, the father starting up in 1920, and they gradually became interested in the exposition of their attractive stock in trade through colored slides, etc., and this then developed into the compilation of books, of which this is the third. - Some omissions noted: Albizzia; Melia (beautiful flowers in spring); Juniperus virginiana; Tamarindus. Errata noted: Corrected names shown here: Palmaceae or Palmae (p. 120); Cytisus scoparius (p. 59); Datura rosei (p. 60); Raphiolepis (not Raphiolepis) (p. 135); Crataegus (not Crateagnus or Crateagus) (p. 58). An important common name used for Paulownia tomentosa is not mentioned: princess' tree. Robinia species are described as shrubs, however in the case of R. pseudoacacia trees up to 25 feet high occur (p. 140). Azalea is given as a good genus with 20 plants figured under this name; which is unfortunate since the genus is not recognized now as separate from Rhododendron; for the sake of accuracy the plants should have been listed under Rhododendron.

"A BRIEF GUIDE TO SOURCES OF SCIENTIFIC AND TECHNICAL INFORMATION" by Saul Herner, ix, 102 pp., 15 figs., Information Resources Press, 2100 M St. N.W., Washington DC 20037 1969/1970. \$4.25 (card cover).

The seven chapters of this book take up the following topics in the area of research and development (R & D): 1) directories - primary: scientific papers, reports, etc.; secondary: textbooks, reviews, abstract and indexing organs; tertiary: compendia based on the preceding; 2) ongoing (continuing) R & D for which final results are not yet available; 3) current or recent R & D with results available; 4) past R & D; 5) chief American libraries and informational sources; 6) preparing one's own personal reference index files; 7) relation of the scientist and engineer to such informational tools. An appendix furnishes important information on how to obtain certain informational literature from the U.S. federal government. The index following gives good coverage. The text of this guide is based on the presentations at a course presented in 1967 to groups of Federal scientists and engineers and sponsored by the Panel on Education and Training of the COSATI (Committee on Scientific & Technical Information).

GMH

"BIOCHEMISCHE GENETIK, EINE EINFUEHRUNG UNTER BESONDERER BERUECKSICHTIGUNG HOEHERER PFLANZEN" by D. Hess, XI + 354 pp. 8°, 33 tabs., 140 figs., 1 col. pl. (dust cover), Springer-Verlag, New York, Berlin. 1968 DM 76,--; US \$19.00.

This introductory text is based on work for the period up to and including 1968. There are three main parts to the text: (1) Gene and chemical characters; (2) nucleic acids as carriers of genetic data in viruses and bacteria as well as in the higher plants; and (3) the regulation of gene activity. For an introductory text, this volume seems to be quite comprehensive with many excellent figures, numerous structural formulas, and useful tables. This hybrid of chemistry and genetics is one of the newest active fields of science in which great progress has been made in the last few years. The first part is of particular interest since it takes up various classes of chemical materials - starches, fatty acids, terpenoids, phenols and phenolic derivatives, and alkaloids - with discussions of their constitution, biosynthesis, derivatives, genetic transmission, etc. This part will be of special interest to phytochemists. There are four indices, including the bibliography (with 1167 references).

GMH

"POLLEN AND SPORES OF CHILE: MODERN TYPES OF PTERIDOPHYTA,
GYMNOSPERMAE, AND ANGIOSPERMAE" by C.J. Heusser, 167 pp.
 3 figs., 60 pls., with 687 figs., 1 map, The University of
 Arizona Press, Box 3398, Tucson, Ariz. 85722 (USA).
 1971. (1½ x 11 in.) \$15.00.

In this monumental work there will be found detailed descriptions of the pollen grains and spores of 698 species representing 624 genera and 178 fams. of the higher plants (Pteridophyta; Spermatophyta) of the very interesting and diverse flora of Chile. 130 endemic genera are represented. Supplementing the descriptions are photomicrographs of excellent quality. Each plate bearing eight to thirty pollen grains/spores bears a scale in microns, which makes the figures that much more useful. Other features of the volume include a diagnostic key to generic (and a few specific) identities based entirely on the structure of the reproductive cell; a glossary; a bibliography; and the thorough index. An outstanding palynologist, Dr. Lucy M. Cranwell (now Mrs. Watson Smith) has furnished an enthusiastic "foreword" to the volume, a sort of imprimatur. The primary purpose in preparing this work was to aid in the study of plant microfossils in the area of the Chilean Pleistocene. While the number of living plant species in Chile runs into the thousands, this work with its emphasis on generic representation should be of great help in any study involving pollens or spores. Most of the pollen studied were obtained from herbarium specimens although a small proportion came from living plants. For identifications, the author has depended in good part on Carlos Munoz' *Sinopsis de la Flora Chilena* (1959). Preceding the systematic part of the volume, there will be found an historical note, and a general description of the vegetation, methods of study, etc. The area covered includes besides the Chilean mainland, the Juan Fernandez Islands and Easter Island, the latter 2500 miles away from but a possession of Chile. This volume should furnish an excellent model for other similar treatments of pollen/spore materials of other areas of the world, and particularly of Latin America. (Jubaea chilensis (Mol.) Baillon is apparently the same palm referred to in Willis' Dictionary (ed. 7) as J. spectabilis Kunth).

GMH

"SIX-LEGGED SCIENCE" Editio 2, by Brian Hocking, vii + 199 pp., several figs., Schenkman Publishing Co. Inc., 3 Revere St., Cambridge, Mass. 02138. 1971. Cloth \$4.95; paper \$2.95.

This book by the outstanding professor^{of} entomology at the University of Alberta (Edmonton, Alta., Canada), was designed to interest, amuse, and educate the layman. It is written in a light and amusing tempo, but, hidden in the amusing and attractive phrases there is a good dose of scientific knowledge. Surrounded as we are by hordes of insects and other arthropods,

notably the spiders, it is remarkable how little the average person knows about them. There is definitely a cultural gap here and although it seems improbable that the insects will learn much about man, there is no reason that man should not acquire a considerable fund of knowledge about his tiny fellow inhabitants on the planet Earth. There are chapters on the various forms, characters, and capabilities of insects, their sensory powers, the great variety shown among members of the group, the economic importance of some members of Insecta, and so forth and so on. For those who become interested and wish more serious reading, there is at the end of the volume a rather well chosen list of references and finally, something usually omitted from popular books, an index. This would be an excellent book to buy as a gift for almost anyone.....

GMH

- (1) "THE DEVELOPMENT OF NATURAL HISTORY IN TUDOR ENGLAND" by F. D. and J. F. M. Hoeniger, iv, 60 pp., 21 pls. (separate), Folger Booklets on Tudor and Stuart Civilization, Univ. Press of Virginia, Charlottesville, Va. 1969. \$1.50.

This treatment is divided into three parts - the text proper (semi-popular in type), suggested readings, and the excellent plates. The history of biological knowledge in England is traced from ca. 1485 to ca. 1599, thus roughly covering the 16th Century.

(2) "THE GROWTH OF NATURAL HISTORY IN STUART ENGLAND FROM GERARD TO THE ROYAL SOCIETY. idem, iv, 54 pp., 19 pls. (separate); 1969. (Price \$1.50). The text is followed by "suggested readings" and the plates. This booklet covers the period roughly from 1600 to 1700, the 17th Century, including discussions on Gerard and his herbal, other herbal writers, such as Parkinson, Thomas Johnson, and Merret, Sir Thomas Browne, and the founding of the Royal Society of London (1660). These publications discuss the importance of the various workers and works and interpret their findings in the context of science as a whole.

GMH

"TEEANALYSE: Eine Anleitung zur Erkennung von Drogen in Teemischungen..." by L. Hörhammer, Ed. 3: 74 pp. (text), with a portfolio containing 60 pls. with 556 figs., 1 col. pl., Springer-Verlag Berlin, 1970. DM. 48; US \$13.20.

The text describes 275 drugs mostly from the standpoint of their appearance to the eye using 6X hand lens. The accompanying portfolio shows these drugs, mostly in whole condition (natural size) and as comminuted drug (usually twice natural size). The drugs are divided into 10 groups and taken up in this order: leaf (30 representatives), herb (77), flower (34), fruit (8), wood (7), bark (25), root (36), rhizome (12), and miscellaneous crude drugs, such as algae, fungi, lichens,

exudations, bulbs, tubers, arils, fruit peels, peduncles, and buds (22). The photographs are excellent. The book and portfolio should be of much assistance in the identifying of both teas and the crude drugs represented, and they thus play a double role. The groups are sufficiently small that a diagnostic key was apparently thought to be unnecessary. Index.

GMH

"QUALITATIVE AND QUANTITATIVE ANALYSIS OF PLANKTON DIATOMS" by M.H. Hohn, xv + 211 pp., 91 figs., 84 tabs., 1 map, Bull. Ohio Biol. Survey N.S. 3(1), 1969.

Studies were made of diatoms in Lakes Erie, Michigan, Ontario, and Superior, with a description of Lake Erie. A check list of plankton diatom species and varieties is included for western Lake Erie, covering the period 1938-1965. The occurrence of individual species over the past 40 years has varied considerably with four chief categories: (1) species previously common, which have more recently disappeared or almost so (ex. Cyclotella stelligera); (2) species previously absent or rare now major dominants (ex. Melosira binderana); (3) species remaining stable in numbers (ex. Asterionella formosa); and (4) species increasing in frequency but with the same percentage occurrence (ex. Melosira ambigua).

GMH

"FLORA OF CHINA" Family 153: Malvaceae. by Shiu-ying HU, 80 pp. plus 24 pls., index; (also 2 cover figs., map, list of fams. covered in Flora of China, on cover) Arnold Arboretum, Harvard Univ., Cambridge, Mass. (USA), 1955.

In this monograph, 14 genera of the fam. Malvaceae are keyed down and treated individually to varieties, with all the usual appurtenances of such a monograph together with useful information on medicinal and economic uses of the taxa in China as well as the Chinese names, in Chinese script. Dr. Hu is a scientist at the Arnold Arboretum of many years standing and well known for her many studies of Oriental plants. She is also very much interested in the practical utilization of plants, particularly in medicine and foods, and so is of very great service in communicating to the west the enormous wisdom of the east in these matters which has accumulated over the course of several millenia. - In this work, the places of collection of the various taxa are shown for the various parts of China (with names of collectors, date of collection, etc.).

GMH

"A PRELIMINARY CHECKLIST OF THE FERNS AND SEED PLANTS OF UPHAM WOODS, BLACKHAWK ISLAND, JUNEAU COUNTY, WISCONSIN" by H.H. Iltis, Edit. 2., 17 pp., c. 1971 (mimeographed).

Upham Woods is located along the Dells (Dalles) of the Wisconsin River, 2 miles n.w. of Wisconsin Dells (town) and is owned by the University of Wisconsin. Five habitats are recognized and described (prairies; pine woods; maple woods; hemlock-white cedar woods; and sandstone cliffs). The check list shows ca. 300 taxa and gives the botanical and common names of Pteridophyta and Spermatophyta which have been found in this park. (Order of Engler-Prantl.) Indices of scientific and vernacular names of families are appended.

GMH

"PRINCIPLES OF RESEARCH IN BIOLOGY AND MEDICINE" by Dwight J. Ingle, Ph.D., xv, 123 pp., 2 tabs., J.B. Lippincott Company, Philadelphia, Penna. 1958. \$4.75.

This well written and well balanced text presents basic guide-lines for the proceduring of experimental work in these important disciplines. There are chapters on limitation of mind (sensory range, phobias, preconcepts, lack of controls, etc.), causality (types of causes, etc.), probability, chance, and randomization, errors (sampling and personal errors, fallacies), heteropoietic factors (referring to differences in results depending on variable external and internal factors, such as sex), principles of testing validity, reliability, standardization, etc.), the experiment proper (experimental design), interpretation of results, theory in biology and medicine, and relationships among scientists (ethics of teacher-student relationships, senior-junior investigator, colleagues, etc.). The author has succeeded in endowing the text with considerable interest by means of vivid examples, etc.

GMH

"INDEX PLANTARUM QUAE IN OMNIUM POPULORUM PHARMACOPOEIS SUNT ADHUC RECEPTAE (Indice delle Piante finora ammesse nelle farmacopee ufficiali dei diversi stati del mondo) (Index of plants which are up to now officially recognized in all of the pharmacopeias of the world). 722 pp., 53 figs., 12 tabs., Antonio Imbesi. Messina, Italy XI, Available through Libreria Santo Vanasia, 71, Via M. Macchi, Milano, Italia. 1964. L 24,000.

The author of this elaborate tabulation of all the vegetable drugs of all pharmacopoeias of all modern times (from 1772, the date of the first edition of the Danish Pharmacopeia) is the Director of the Institute of Pharmacognosy of the Università di Messina (Piazza XX Settembre). The following are the principal sections: (1) historical-bibliographical note on pharmacopeias,

is considered in turn; (2) pharmacognostic observations on the pharmacopeias; (3) alphabetical table of countries with editions, dates, numbers, and abbreviations used; (4) dates of first editions of pharmacopeias; (5) abbreviations of authors of plant epithets; (6) medicinal plants cited in the works of Celsus, Scribonius, Pliny, and Dioscorides; (7) the chief part of the work, a listing of plants by alphabetical order of genus, indicating correct botanical names, parts used, where official, etc. (583 pp.) followed by an Addendum to the same of 17 pages, representing additions necessitated by new editions of the Chilean (3rd), Japanese (7th), and Soviet (9th) which have since appeared. Finally, there is an index of the drug titles by Latin name.

A few criticisms are in order: The National Formulary (editions I to XII, from 1880 to 1965) should have been included. This book is legally equivalent to the U.S. Pharmacopeia as a drug compendium, and in the past has had many more crude vegetable drugs than the U.S.P. / A very useful compilation which would have facilitated use of the book would have been a one page listing of current pharmacopeias with the edition number and date, using abbreviated titles and in alphabetic order. For instance, Arg. IV, Austr. IX., Belg. IV, B.P. X, Bras. II., etc. This might even have been printed on a book mark. / Quite a number of omissions were noted, mostly representing N.F. drugs: Mitchella; Statice (Limonium carolinanum); Mentha cardiaca. Ipomoea orizabensis is not shown for any US compendium, whereas it was official in the N.F. VIII-XI. The fruit of Xanthoxylum americanum and X. clava-herculis is not indicated although this was official in the N.F. IV-VIII.

There is a discussion of the U.S.P. 1830 New York Convention edition; in that year, two pharmacopeial conventions were held, one in New York, the other in Philadelphia and each convention published a separate pharmacopeia. However, no attempt apparently was made to include drugs of the N.Y. Convention, in "Index Plantarum."

Other errors or omissions: Berberis aquifolium should be Mahonia aquifolium (nom. conservandum) (page 208). Aletris farinosa is "Starwort" (p. 149). Aluna root should be Alum root (p. 402); Juniperus virginiana was official as red cedar leaves in USP early editions; USP 1830 (NYC) recognized Juniperus communis "berries" (galbuli) and tops. The name Mentha spicata L. is generally recognized not M. viridis L., which is considered a synonym (p. 476); the leaves of Papaver somniferum var. album were formerly recognized in the Spanish Pharm. (according to Tschirch) (p. 513). Pterocarpus santalinus was last official in USP XIV (XIII) (p. 574).

Another possibility which might have been explored in the compilation of vegetable drugs would have been inclusion of plant names where an active principle is represented. Thus, while Rauwolfia serpentina is not and never has been official in the USP, yet reserpine, its characteristic alkaloid, has been official there since 1959. (Rauwolfia has been official in the NF. since 1960). Other omissions: Aralia racemosa (NF. IV-V); Baptisia tinctoria (NF IV-V); Chionanthus virginica (NF IV-V); Cocillana (Guarea rusbyi) (NF IV-V); Dicentra canadensis (Corydalis) (NF IV-VIT); Dioscorea villosa (NF IV-V); Brauneria pallida and B. angustifolia (NF IV-V); and others.

In a work of this size and complexity, errors are bound to occur; in spite of them, we have here a very valuable work, which every library of pharmacy, pharmacology, pharmacognosy, medicine, or economic botany should possess. A second edition within a decade or so would be of great value in bringing the work up to date following the appearance of new editions of the various pharmacopeias.

GMH

"AMERICA'S SYSTEMATICS COLLECTIONS: A NATIONAL PLAN" by H.S.

Irwin, W.W. Payne, D.M. Bates, and P.S. Humphrey (Editors).
xiv 58 pp., 10 tabs. 1973.

This is the report of a special committee of systematic biologists (the Belmont Writing Committee) prepared in Oct. 1972 at a meeting at the Belmont Estate, Maryland, of the Smithsonian Institution. It is concerned with systematic collections in all fields, principally botany and zoology, regarded as a national resource. Ways and means are proposed for making such collections more effective tools in the service of science. Suggestions include a survey of such resources, improving the quality and quantity of professional personnel associated with such collections. Following the discussions, there are a series of tables incorporating much statistical information dealing with these collections, including estimates of needs.

GMH

"A SCIENTIST AND HIS EXPERIENCES WITH CORRUPTION AND TREASON

IN THE U. S. MILITARY-INDUSTRIAL ESTABLISHMENT" by
Donald H. Jacobs, xiv + 649 pp., 30 figs., The Jacobs
Instrument Co., Ltd., 3114 Beach Drive, Victoria, B.C.,
Canada. 1969. \$30.00.

Here have we the epic story of a modern Prometheus attacked by the eagles and hawks of the Defense Department. Jacobs is said to be one of the outstanding inventors responsible for advances in the bomb sights used in military aircraft and his desire for perfection and genuine quality in this equipment was

opposed by the military office holders who apparently showed little or no interest in best defense efforts, hence in effect acted treasonably, according to the author. The story is told in detail, with names, places, and dates; it has the ring of authenticity and truth. In this book, the inventor first tells his life story from 1915, when born in New York City, later of his school and college life, and then of his professional career in Albuquerque, N.M., Los Angeles, New Jersey, and elsewhere. The author explains the unappreciative attitude of the military (p. 324) by saying that "the military people had taken over the scientific weapons field so completely since World War II that all key scientists had been eliminated from control of weapons research, and it was now completely in military hands." From his statements (and he shows proofs) it appears that the Navy did not pay him fairly for his long hours of labor carried on for many years and for his productive efforts. It seems clear that "the program is...manipulated by Government officials for private gain to the vast detriment of the national military stature." In addition to the difficulties with the U.S. Navy, Mr. Jacobs also got into hot water with the Income Tax Division of the Federal government, which apparently took advantage of the situation. It is not hard to believe the transgressions and the unfairness of the income tax office. Finally, Jacobs got sick of the mess and went to live in the beautiful city of Victoria, B.C. in the Dominion of Canada.

GMH

"SENOR KON-TIKI" by Arnold Jacoby, 424 pp., 56 black and white photographs, 1 portrait (dust cover), Rand McNally and Company, P.O. Box 7600, Chicago, Illinois 60680. 1967. \$6.95.

This is the story of Thor Heyerdahl, the man and the scientist, written by a boyhood associate. A chronology might be composed along the following lines for Heyerdahl:

- X/6/1914: born in Larvik, Norway
- I/37: went to the South Seas (Fatu Hiva, in the Marquesas) with his wife, Liv.
- III/38: arrived back in Larvik.
- 1939: visited British Columbia, Canada (Bella Coola, Vancouver, Victoria, Trail). At the latter, he worked at the smelting plant, living at Rossland, the summer at Arrow Lake; and went to U. Wash. (Seattle)
- Fall/1941: Baltimore, Maryland, awaiting a call from his nation
- II/42: Joined Norwegian Armed forces in Canada.
- 1943: As member of armed forces to England and Scotland.

- X/44: Assigned to active duty in sabotage for the Norwegian army
 X/44: Returned to Norway (via Murmansk)
 VIII/45: Discharged from Norwegian Armed Forces
 IV/38/47 Kon Tiki raft voyage across the Pacific from July, Aug. South America
 early summer, Second marriage; Santa Fe, New Mexico (USA) 1949
 1952: Published "American Indians in the Pacific".
 1953: Visit to Galapagos Islands
 1955: Visits Easter Island to make archeological studies.
 1958: Goes to live in Colla Micheri (Liguria), Italy, his present home
 1960: Jacoby went to no. Italy to visit T.H. and write his biography.

Heyerdahl's early unpopularity among archeological scientists and rejection of his ideas slowly developing into acceptance and eventually acclaim and high honor is clearly and interestingly expounded. This is an informative as well as an interesting account of an outstanding person. - There are several misprints; ex., Olso for Oslo, etc.: also a few errors of fact (ex., "genes" for blood factors, p. 399). But these are really minor.

GMH

"SELECTARUM STIRPIUM AMERICANARUM HISTORIA Nicolai Josephi Jacquin", Facsimile of the 1763 edition, 2 vols.: v. 1: Text. Fl-F32 = 10 pp. (unpaginated) + I-XII + 1-284 + 14 pp. (unpaginated); totl 352 pp., V. 2: Plates. (unpaginated); 32.5 x 22 cm, Hafner Publishing Company, Inc. New York City. 1971. \$62.50.

This impressive work of the Baron Nicolaus Josephus Jacquin (1727-1817) has been admirably reproduced and thus made available to students of botanical taxonomy. The "History of Selected American Plants" is a good deal more than a mere history; the Latin "Historia" can here be interpreted as meaning a systematic account of the plant from the standpoint of morphology, habitat, geographical range, etc. In addition to the text and engravings of the original edition, an extensive discussion ("Foreword") of Jacquin and his activities is given, written by Dr. Frans A. Stafleu. (pp. Fl-F32). This includes a biographical account: details on his collections and publications: a translation into the English language of the Praefatio (Preface), which is of course, like the entire work, in Latin; discussion of the botanical exploration of the Caribbean Sea before Jacquin's work; an explanation of the various abbreviations and references which appear in Jacquin's work; and references pertaining to Jacquin, his labors, and contemporary botanical history. - As to the work proper, the title page as was usual in

the period of its publication is elaborate with an engraving of two ships in heavy seas in the background, and in the foreground the land with Indians, plants, and a single white man. The place of publication, Vindobona (Vienna) is indicated, as well as the date 1763. In following pages is the dedication to Francis I, Holy Roman Emperor; the Preface; an index of plants by botanical name (binomial) showing corresponding pages of text and plate number; and then the text proper. The order used is that of the Linnaean system. The plants described and figured were collected in Martinique, Jamaica, what is now Hispaniola but was then denominated "Domingo", and in other islands as well as on the adjoining continental areas. There is at the end of the textual volume an appendix with additional plants, indexes of botanical names and vernacular names, a catalog of authors cited, and a keyed explanation of the plates. The volumes are well bound in cloth, with on the front covers the title in gold and a copy of one of the engravings of Hirtella americana (branch). These large volumes are as additions to the library physically attractive as well as being a useful subsidiary reference.

GMH

"HORTICULTURAL SCIENCE" Edition Two, by Jules Janick, xi + 586 pp., 324 figs., 24 tabs; W.H. Freeman and Company, 660 Market St., San Francisco, California 94104. 1972. \$12.00.

This hard-back cloth-bound textbook represents a self-contained treatment of the title subject, with adequate backgrounds in botany (systematics, morphology, physiology, etc.) to inform the student adequately in an elementary course. The subject is presented in an interesting and lucid manner, the ideal of any teacher. Numerous illustrations and tabular compilations of data enliven the pages. There are three main divisions ("parts"): biology; technology; industry. Under the first, the classification and structure of horticultural plants are taken up, along with plant growth and development. In part II, there are chapters on controlling the plant environment, directing plant growth, biological competition, mechanisms of propagation, plant improvement, and marketing. Part III includes horticultural geography, production systems (taking up special fields of horticulture, such as plantation, orchards, vegetable farming, landscape horticulturing, turf production, etc.), and crops, and a last chapter "Esthetics of horticulture", which tells us how the beauty of the home and other environments can be improved by the intelligent cultivation of appropriate plants. A generally adequate index follows. - The chapter on horticultural crops was of special interest since it indicates what a diversity of plants are included within the scope of horticulture: fruit crops, including nut crops, beverage crops, spice and drug crops, vegetable crops, salad

plants, solanaceous fruits (ex. tomato), edible legumes, starchy root vegetables, cole crops, vine crops, etc., and ornamental crops. - In the section on spice and drug plants, several errors were noted, eight on page 521 alone. For instance, it states rather ambiguously, "there are over 200 species of spice and drug plants collected for use in the United States alone". This was intended to mean that throughout the world (including the USA) 200 such plants are collected for use in the USA. On page 522, "peppercorns" should of course be "peppercorns". Neither peppermint nor spearmint are commonly cultivated in Japan - these are different entities from "Japanese mint" (J. peppermint) which is widely grown there. Vanilla contains no essential oil as stated (p. 523) but only a fatty oil; the fine aroma is due to vanillin. The "seeds" of celery and other umbelliferous spices are actually fruits. Despite such errors, the book is all-in-all an excellent textbook.

GMH

"ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS" (Editors: R.F. Johnston, P.W. Frank, and C.D. Michener). Vol. 2: ix + 510 pp., 58 figs., 8 tabs., 2 charts, 6 matrices. 1971. No price given.

The text is made up of 19 chapters, each one by a scholar or scholars specializing in the subject of his or their review. The following are concerned importantly with plants (or plants and animals or organisms in general): (6) Laboratory stream research: objectives, possibilities, and constraints (C.E. Warren and G.E. Davis). (7) The measurement and application of the calorie to ecological problems (R.T. Paine). (8) Significance of intestinal microflora in herbivores (R.H. McBee). (11) Adaptive radiation of reproductive characteristics in Angiosperms. II: Seeds and seedlings (G.L. Stebbins). (This concerns the various special adaptations found in seeds and seedlings which permit them to survive and persist under different environmental conditions). - (12) High-latitude phytoplankton (Mary Belle Allen). (13) The hypothesis of nonspecificity and taxonomic confluence (J.S. Farris). - (14) Principles of clustering (W.T. Williams). - (15) The karyotype in systematics (R.C. Jackson). - (17) Arctic and alpine plant life cycles. (L.C. Bliss). - (18) Phytotelematic biota and community structure determination in plant-held water (B. Maguire, Jr.). (In this contribution, there is a discussion about phytotelemata, small bodies of water occurring on leaves or flowers or in holes in trees and typically populated, at least in the hotter areas of the earth by algae, fungi, protozoa, insects, and other small forms of life. They are richest in biota in the tropical wet areas. Pitcher plants (Sarracenia species) and bromeliads are well known for their water accumulations. The mode of colonization of organisms is often an enigmatic problem. In this chapter the author who is associated with the University of Alaska had

discussed the Arctic and Subarctic areas (bathymetry, major currents, light, ice, etc.) and related these environmental parameters to the periodicity and numbers of the phytoplankton. The community of microalgae living in the ice is very unusual and worthy of further study. Another problem is the possible differences in the plant and animal forms at the Arctic compared with the Antarctic. It has been shown that ice formation is different in the two regions and that fishes in the two regions have differing metabolic states.) This excellent review of pertinent subjects ends with extensive author and subject indexes.

GMH

"THE GOLDEN AGE OF SCIENCE" by Bessie Zaban Jones (Editor),
xxxvii, 659 pp., Simon and Schuster, 630 Fifth Ave., New
York, N.Y. 10020. 1966. \$12.00.

This volume presents a series of biographies of great scientists of the 19th century, written by their contemporaries, usually acquaintances, and originally published in the Annual Reports of the Smithsonian Institution. The individual biography is concerned with the man's works and outlook at the same time that an account of his life is given. There is a minimum of annotation. Among the 30 scientists included are Asa Gray, Joseph Dalton Hooker, and Charles Darwin. In the table of contents, the name and vital dates are given; it would have been advantageous to the user to have also included the specialty, such as (Mathematics).

GMH

"BASIC MICROSCOPIC TECHNIQS" by Ruth McClung Jones, xiv +
333 pp. 27 figs., 1 tabl., Univ. of Chicago Press, Chicago,
Illinois (USA) and London (England). 1968. \$6.50.

While the book is devoted primarily to the microscopic study of animal tissues, much of the content is useful and applicable to that of plant materials. There are chapters on study of the whole organism; killing, fixation, and storage; stains and staining; non-section methods (smears, squashes, prints, etc.); histological stains; hematology; hard tissues; embryology; cytological methods (nuclei, chromosomes, mitochondria, etc.); histochemistry; injection methods; the microscope and simple magnifiers; drawing; collection of specimens; etc. There are appendices on reagents and supplies, formulae, equipment, and dealers. Finally, a glossary, bibliography, and index complete the treatment. The book is based on M.F. Guyer's "Animal Micrology" (1906-1953). The author is daughter of C.E. McClung (editor, "Handbook of microscopical technique"; 1929). The book reviewed is a practical and understandable textbook, - Error: page 200: paragraph 4: last line: 0.04 mm. should be 0.025 mm.

GMH

"ORDERS AND FAMILIES OF MALAYAN SEED PLANTS: synopsis of orders and families of Malayan Gymnosperms, Dicotyledons, and Monocotyledons," by Hsuan Keng, xxiii plus 429 pp., 207 figs., 1 frontispiece, 1 fig. on dust cover, Univ. of Malaya Press (available from Univ. of Malaya Co-operative Bookshop, Ltd., Univ. of Malaya, Pantai Valley, Kuala Lumpur, Malaysia). 1969. Price M \$60. = c. \$ U.S. 20.00.

This work can serve in a dual capacity, on the one hand serving as a manual in the teaching of botany and on the other as a convenient scheme of reference for comprehending the arrangement and relationships of plant taxa, somewhat like the works of Rendle ("Classification of flowering plants") and of Lawrence ("Taxonomy of vascular plants") except that these works related to temperate land floras whereas the present work considers tropical plants, including many groups not mentioned in Rendle or Lawrence. The arrangement followed for the Gymnospermae is that of Engler-Diels, whereas the monocots and dicots have been set in the order used in McLean and Ivimey-Cook ("Textbook of theoretical Botany," vol. 2; 1956) and by Firbas (in Strasburger, "Lehrbuch der Botanik," ed. 28; 1962). Garnishing many pages are excellent line drawings of various species as means of illustrating the characteristics of the respective families. Such illustrations almost invariably show a branch with leaves and flowers/fruits, individual flowers, floral parts (sometimes as diagrams or exploded to show sequence), a floral diagram, fruit, and seed. The text presents descriptions in brief form with an indication of numbers of genera and species in Malaya, and the economic value of various species, such as in foods, lumber making, medicinals, or technology. There are numerous keys throughout the text, all the way down from the Division Spermatophyta to genera. The book seems to have been well and accurately written and thoroughly proof-read, since errors were not noted in sample readings of the text. At the end of the volume, there are a Bibliography, Appendix I with order and family names in Malay and Chinese, Appendix II with a simple artificial key to the commoner families, a glossary (with illustrations), an addendum, and an index of scientific names (family and genus). - The coverage is of plants native to or naturalized or commonly cultivated in the Malay Peninsula and on Singapore Island; in a few cases with plants on Sarawak and Sabah. The book should be of interest not only in tropical and sub-tropical areas, but also to taxonomic students everywhere.

GMH

"SEAWEEDS OF CAPE COD AND THE ISLANDS" by J.M. Kingsbury,
X + 213 pp., 115 figs, The Chatham Press, Box 281, Chatham,
Mass. 02633. 1969. \$12.50.

The text of this book alternates with excellent drawings prepared by E. and Marcia Norman. Generally, one text page and an opposite figure are used to cover each species. In this way, some 93 species of Chlorophyta, Phaeophyta, and Rhodophyta are covered. At the end of the descriptive text there are a key to genera and species, a glossary (mostly referring by page number to definitive texts), a very brief bibliography, and the index. The introduction discusses several higher plants growing in sea water (such as eel grass, *Zostera marina*) which are often mistakenly taken for seaweeds or Algae. - In the individual treatment of algal species, the botanical name is used in the heading, along with the order to which the plant entity belongs, the etymological derivation of the name, and a general statement on distribution. The descriptive paragraphed information follows in smaller type-face. A successful combination of technical information with non-technical language results in a productive popularization of the scientific facts about Algae. At the same time, the coverage of important and interesting data on seaplants will appeal to the scientist reader as well as to the layman.

GMH

"WILD EDIBLE PLANTS OF THE WESTERN UNITED STATES" by Donald R. Kirk, 338 pp., 339 figs., 2 portr., 1 col. pl., Nature-graph Co., Healdsburg, California. 1970. Paper back; \$3.95.

In this useful volume, plants are included from Southwestern Canada and northwestern Mexico in addition to those of the twelve states included in the Pacific Coast and Rocky Mountain States. The 302 plant species are arranged according to geographical location: (1) generally throughout the west; (2) northwest US; (3) southwest US; (4) The Rocky Mountain states. For each plant the data are presented in the following order: Names, scientific and common; preparation and uses; habitat and distribution; description and illustration. There are a glossary of botanical and food terms, a useful bibliography, and three indices: a plant name index, a non-food use index, and a food use index. The paper is smooth and durable (unlike that of most paper backs), the printing clear, the figures (line drawings) excellent, and the job generally well done. In this day of a return to the wilderness, the appeal of this book should be almost universal since so many are now in sympathy with the ideals of a simple rural life. It will also appeal to those who believe we should consume more fruits and vegetables, to those with money saving in mind, and to those who may desire to experiment with new tastes and aromas.

GMH

"BACK TO EDEN" by Jethro Kloss, VII, IX, 671 pp., XIII (Index); total: 700 pp.; 36 figs., 1 portr., Lancer Books, Inc., 1560 Broadway, New York, N.Y. 10036. 1939 (1971). \$2.00.

This paper-back represents an unchanged reprinting of a popular work on "herbal medicine" available in the '30's. It brings out the pet treatments and fads of the writer, with one chapter devoted to each subject: fruits; oranges; cooking in aluminum containers; fasting; eating meat; fresh air and exercise; and so on. Much of the text is a kind of cookbook. This is now referred to as an "underground classic", meaning that it is not recognized by the medical profession, I suppose. Whereas much of the text expounding well known health principles is sound enough, some parts should have been deleted, such as the section on cancer, which is very misleading. Biographical data on the author who called himself an "herbalist" would have been interesting. Even the dates of his birth and death are not given. The author shows a strong religious belief throughout and appears to equate his system of "natural medicine" to the Creator!

GMH

"MYCOLOGICAL STUDIES HONORING JOHN N. COUCH" Edited by William J. Koch, ix + 280 pp., 1 portrait, many figs. and tabs., The University of North Carolina Press, Chapel Hill, No. Carolina. 1968. \$10.00.

This fine cloth-bound volume is made up of articles which appeared in a single issue of The Journal of the Elisha Mitchell Scientific Society (vol. 84, No. 1; Spring, 1968), published by the same press. There are 40 articles in the "Festschrift", published in honor of the Kenan Professor of Botany Emeritus at the University of North Carolina. As would be expected, the first article in the volume is a tribute to this outstanding mycologist ("The career of John Nathaniel Couch"), and includes a listing of his publications (1920-1967). Many of the articles which follow are of outstanding interest to the mycologist and sometimes to botanists of other areas, and as might be expected also to scientists in other disciplines. Thus, one article deals with a patently chemical subject: "Pigments of the Actinoplanaceae". Another one would appeal to the ecologist: "Ecology of Coelomomyces infections of mosquito larvae". The plant physiologist would find of interest the article titled: "Some nutritional requirements of an unidentified Micromonospora". To a cytologist, among other numbers, the paper on "Ultrastructure of Pilimelia anulata (Actinoplanaceae)" would be of interest. The plant pathologist would no doubt find of interest the contribution entitled "Extension of the host range of Octomyxa

brevilegniae". A parasitologist might well be intrigued by a title: "Infection by *Coelomomyces indicus* of *Anopheles gambiae*". Truly there is something for everyone!

GMH

"UNKRAUTBEKAEMPfung" by Dr. Werner Koch, 342 pp., 42 figs., 32 tabs., Verlag Eugen Ulmer, Gerokstr. 19, Stuttgart, B R D (German Bund Republic). 1970. DM. 34.-.

In this volume there is dealt with from various viewpoints the very important matter of weeds - their biology and ecology, measures for getting rid of weeds, the herbicides, weed removal with various cultivations (cereal grains, maize, sugar beets, mangel wurzel (fodder beets), potatoes, rape and turnip, cabbage, pulses, carrots, celery, red beets, lettuce, and endive, spinach, asparagus, onions, fruits, meadow crops, grapes, etc.), weed extirpation in forestry and measures for the removal of weeds (or other undesired plants) in areas classed as non-farming and non-forest as well as in areas used for horticulture. The last chapter may well be the most important in the book, in view of the present tendency to avoid active herbicidal "poisons" so as to reduce pollution of our environment and to use non-toxic biological controls wherever possible. The book is written in simple German with many graphic aids to an understanding of the subject matter. An innovation of the publisher is the making available to interested persons of "reading samples", being mimeographed passages from the book which should give a good idea of the style, coverage, and utility of the text.

GMH

"DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY" by Various Authors, C.F. Koda, (editor), IX, 398 pp., many figures and tables, Proceedings of the 18th General Meeting, Society for Industrial Microbiology. Held at Lafayette, Indiana, August 27-31, - Plenum Press, 227 West 17th Street, New York 11, N.Y. 1962. \$13.50

39 papers are published in this volume, aside from the Introductions; a fortieth paper was withdrawn (Potentiation of bacterial growth by algal extracts, by J.M. Sharpley). Several main classifications of papers are indicated: (1) Microbiological applications for space vehicles and extraterrestrial stations. (2) Preservation of oil-in-water systems. (3) Problems in water microbiology. (4) Fermentations. - As might be expected, there is a wide diversity of topics included in this as in preceding numbers of the series: ranging from anticancer antibiotics, hallucinogenic mushrooms, wood rotting through fungal activity, antibiotic non-medicinal uses, fungicides, etc. All articles of course are concerned with the utilization and control of micro-organisms. The largest single block of papers

is that dealing with space travel: here such illuminating titles are to be found as these: nutritive value for Algae of fecal pyrolysis gases; microbial protein for the space age; human feces as a nutrient for Algae in closed space ecologies; microbial synthesis of animal feeds from human waste substrates; control of waste putrefaction in space flight; human feces as a nitrogen source for some green Algae; and others. - It is obvious from these articles that the space travellers of the future may expect to sacrifice some of the pleasures of the table for the excitement of supersonic velocity travels to far realms. While earth-bound humans will enjoy their roast beef, green peas, and ice cream, planetary visitors will have to be content apparently with kelp stew, spirogyra broth, and weed coffee!! - The various contributions in this useful book will no doubt be abstracted in the various abstract media. - The reviewer will cover several of the chapters for Excerpta Botanica, Sectio A. (ex. ESPENSHADE, M. A. Isolation and cultivation of Basidiomycetes).

GMH

"LILIIFLORAE AND MICROSPERMAE" Flora of the U.S.S.R., Vol. IV. V.L. Komarov, (chief editor), xxxiv + 586 pp., 44 pls., 2 maps, Akademiya Nauk SSSR., Botanicheskii Institut, Translated into English. Available from U.S. Dept. Commerce, Springfield, VA. 22151. 1968. Price not given.

The families covered are as follows:

(XXXIII) Liliaceae; Amaryllidaceae; Dioscoreaceae; Iridaceae; Orchidaceae. The first four families represent Liliiflorae, Orchidaceae the Microspermae. In addition to the systematic part of the text, there are an Addendum (III) with 46 spp. nov. (in Latin) (however, these diagnoses were published in 1935, hence are of interest only as the original treatments) also an alphabetical list of families and genera which appear in this volume; a list of the vegetation regions of the USSR; and an explanatory list of abbreviations for Russian institutions and journals appearing in the text. 14 compilers are listed for this volume.

GMH

"SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES OF STRYCHNOS" VIII, by B.A. Krukoff and R.C. Barneby, 29, 1-93, 7 figs., tabs., Memoirs N.Y. Bot Gard. 1969.

This number of the series contains new information on 71 spp. of Strychnos together with a number of infra-specific entities, together with 14 appendices including summary information of the taxa so far taken up. A key is provided to fruiting or sterile materials of American Strychnos. Included are the following new species: S. romeubelenii (coastal forests of

Bahía, Brazil; related to S. rondeletiioides Spruce ex Benth.); S. araquensis (Goiás, Brazil; related to S. erichsonii Schomb. ex Prog.); S. bahiensis (Bahía, Brazil; belongs to sect. Longiflorae); (Pará and Amazonas, Brazil; related to S. diaboli Sandwith); S. goiasesis (Goiás, Brazil; related to S. panurensis Sprague et Sandwith); S. progeliana (Amazonas, Brazil; related to members of sect. Breviflorae); S. atlantica (Belmonte, Bahía, Brazil; of sect. Breviflorae); and S. cerradoensis (Minas Gerais, Brazil; related to S. nigricans Progel); and S. neglecta (Amazonas state, Brazil; sect. Breviflorae). One var. nov. is described. There are also range extensions for 33 spp., reinstatement of 3 spp. as valid, and placing in synonymy of 5 spp.

GMH

"SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES OF STRYCHNOS. IX,"
by B.A. Krukoff, and R.C. Barneby, Memoirs N.Y. Bot Garden
20: 94-99. 1969.

This paper reports the results of a continuing study of specimens in various herbaria of the world. Information is given on 27 species, including extensions of range for 7 of them. There are no novelties. Examination of the types of S. parvifolia DC. and S. rubiginosa DC. indicates that for the time being they are best treated as distinctive spp. As in previous instalments, mention is made of any chemical information or data on medicinal usage or toxic properties. A total of 54 herbaria has been visited for specimen examination (important exception: Muséum d'Histoire Naturelle, Paris) and it is felt that nearly all specimens extant collected of American Strychnos have been examined. Some recent publications have also been considered in updating the authors' treatment of this group.

GMH

"THE BIOLOGY OF PARASITIC FLOWERING PLANTS" by Job Kujit,
xiii + 246 pp., 187 figs., 4 tabs., Univ. of California
Press, Berkeley and Los Angeles, Calif.; London, England.
1969. \$15.00

This is a most interesting book, treating as it does of those mysterious higher plants which thrive by growing on other higher plants, sucking their life-giving sap and thus comparable to such animal parasites as the vampire bats or fleas. In this large folio-sized volume, there are 9 chapters: an introduction; then chapters on the mistletoes; sandalwoods and relatives; the broomrapes and parasitic figworts (Scrophulariaceae); members of families Rafflesiaceae, Hydnoraceae, and Balanophoraceae; genera Cuscuta and Cassytha, and families Lennoaceae and Krameriaceae; the specialized sucking organ called the haustorium; physiological aspects of parasitism among plants; and the evolutionary aspects of the parasitic way of life. This is

followed by an immense bibliography (30 columns) and the tripe-columned index. - The book is somewhat deceiving if one considers the page count; actually it must represent the average book of twice the number of pages at least, since the print is rather small and there are two columns to each large page. The pages of text are decorated with many drawn figures and photographic prints so that it is almost in the order of a graphic account of this group of plants. - One of the most interesting chapters deals with the many genera and species of mistletoes, members of the family Loranthaceae. Surprisingly to most Europeans and Americans is the fact that most taxa of mistletoes are natives of the tropics and sub-tropics, with a mere handful found in the temperate regions. The family is larger than generally realized, with 36 genera and about 1300 species now recognized. This chapter deals with habits and modes of parasitism; the morphology and biology of the flowers; embryology including fertilization of the egg cell, growth of embryo, and development of seedling in the early stages of independent life, fruit development and dispersal; and the mutual relationships of the mistletoes. The early history of human knowledge about these and the other parasitic plants is treated in Chapter 1, where also the uses, superstitious beliefs, folklore, etc., are taken up. This book is of value both as a reference work and for the intrinsic interest of the subject to serious students.

GMH

"THE NARCOTIC COMPLEX OF THE NEW WORLD" by W. La Barre, 14 pp., Bobbs-Merrill Reprint Series in Anthropology. 1971

This represents a review of the use of psychotropic drug agents in the Americas as a means of furthering the religious experience, specifically by fostering shamanism. A shaman is a human priest believed to be in the "possession" of a master spirit or the god. The drugs discussed include tobacco, alcoholic drinks, peyote, Datura spp., caapi, caffeine drugs (yaupon, maté), ololiuhqui, yopo, Salvia divinorum, hallucinogenic toadstools, and coca. Of course there were several other agents in use.

GMH

"INTRODUCTION TO THE FINE STRUCTURE OF PLANT CELLS" by M.C. Ledbetter, 51 plates and 8 text fig. IX, 188 pages, Berlin-Heidelberg-New York: Springer-Verlag. 1970
Cloth DM 54,--; US \$14.80.

The tremendous potentialities of the electron microscope have been drawn upon in this volume, which is essentially an album of electron photomicrographs with attached detailed legends. The book is appropriately composed of large sheets (folio size) of heavy shining-smooth paper in order to give maximum reproducibility to the micrographs. The authors are

associated with prestigious institutions - Ledbetter with Brookhaven National Laboratories and Porter with Harvard University. The contents of the book are distributed among ten chapters with the following subject matters: general cell structure; fine structure interphase cell (resting cell) and cell organelles; dividing cells; cell wall and plasmodesmata; vascular tissues (vessels and sieve tubes with companion cells); sclerenchyma (mis-spelled schlerenchyma) (fibers and stone cells) and collenchyma; epidermal cell and variations; photosynthetic apparatus (mesophyll, chloroplast); cells having special inclusions (chromoplasts, laticifers, tannin cells); germinative tissues (PMC, pollen grains, pollen tube, etc.). The volume has many applications: it will interest general botany students in giving concrete examples of some of the cell mechanism apparatus about which they learn in their classes; it will be equally as useful to advanced students in furnishing visual information on the important furniture of the cell. Another valuable feature of the book is the "Supplementary reading" following the descriptive text for each plate; these references (mostly in English) will enable those interested to read more on the subject, a valuable help if one considers how much time can be wasted in searching for a source of detailed information. (General information of course is easy to come by). Some of the plates represent lower magnifications (in the range of the light microscope) and are intended for orientation purposes. In some cases, such micrographs are marked with a rectangular box and this section shown at higher magnification in a subsequent photograph. Two of the 51 plates are diagrams not photographs. (There are 59 figures all told) There is additionally a micrograph on the dust cover, the identity of which is not revealed; possibly it is mesophyll cells of Phleum pratense (timothy) (see plate 8.1). - On page 149, the raphid (raphide) cell is discussed and "raphid" or "raphide" (spelled in the text both ways) is defined to mean a bundle of needle-shaped calcium oxalate crystals. Most authorities use raphide to mean the individual acicular crystal, not the bundle. On the same page, "crystalizes" is a misspelled word. On p. 150, the first reference would be more correctly cited as Handbuch..Pflanzenanatomie.

GMH

"GOOD-BYE TO ALL THAT" by Harris Lewine, (Designed by Alan Peckolick), 128 pp., many figs. (s.n.), McGraw-Hill Book Co., New York, St. Louis, etc. 1970. Price unstated.

This volume is in the form of a tin box of Lucky Strike cigarettes (old design) which held 70 cigarettes and was called a "flat seventies". The text is lightened by a miscellanea of illustrations, including many actors and actresses of the screen smoking cigarettes at a time when the vice was considered a fashionable act. It is difficult to understand the significance of the book or the reason it was written. Apparently

it is a kind of history of the rise and present decline of cigarette smoking. Cigarette smoking of sorts dates from very early times in America, but the modern cigarette as we know it originated apparently in 1832 among the Egyptians. The book is nostalgic with stories of the past, of an old Auburn Speedster (car), the days when cigarette cards were popular (the reviewer remembers the fad as a schoolboy in England) when at the boys' school he attended the recess was taken up mostly in trading the cards). The book revives many fond memories for the person who is old enough to remember. The author is in error in supposing that cocaine induced "dreamlike, thoughtful states" (p. 15) (actually cocaine is stimulating). The order of illustrations on a page is not clockwise as stated in the legends.

GMH

"MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC INDEX (MDE)" 11th edition. by Arthur J. Lewis, (Editor), X + 788 pp., The Yorke Medical Group, The Reuben H. Donnelley Corp., 466 Lexington Ave., New York 10017. With Supplement, Jan.-June, 1970. 24 pp. 1970. \$26.00 + 0.50 (handling charge).

In this text of 822 pages, one will find a current compilation of drugs (or "compendium") of outstanding value. Strongly bound in an attractive red hard cover, the book deserves and will secure a place on the No. 1 book shelf of many a medical library, physician's office, and pharmacy reference collection. For 35 years the book has been a most useful and a much used work - often the basis of collegiate courses on new drugs. . The many items covered are arranged in alphabetical order from page 1 to page 741 running from Accelerase-PB to Zymafolic. Following this is a therapeutic index going from "abortion therapy" to "X-ray contrast media". Then comes the manufacturers' index from "Abbott Laboratories" to "Wyeth Laboratories", covering of course only the companies whose products are listed here. With this latter index one can see at a glance the chief products of each respective firm. Preceding the main body of text are foreword, table of contents, instructions on using the book, and a useful glossary of dispensing forms which have been trademarked (from Abboject to Zestab). Both pharmaceuticals and biologicals are included. Although most products can be found by using the total alphabetic sequence of the text, there are eight important groups where drugs have been segregated within the respective group and would have to be looked for in this place. These groups are listed in the Table of Contents and include the adrenal corticosteroids, erythromycins, fluoride-vitamins, insulins, penicillins, phenothiazines, sulfonamides (antibacterial), and thiazide diuretics. Fortunately, these items have been cross-indexed in the text. Thus for instance, if you did not know that Fluphenazine is a phenothiazine derivative, or did not know the manufacturer or the prime therapeutic

application, you still would not miss it, since it appears on page 319, between Fluoxymesterone and Fluprednisolone. One criticism I might make is that these cross entries might well be printed in a heavy face type, else they might well be overlooked. For each item, the data are arranged in the following order: trade name, chemical name, description, indications, contraindications, precautions, adverse reactions, dosage and administration method, and availability (dispensing forms). A list of manufacturers with their addresses does not appear: it might be rather useful.

GMH

"DRUGS FROM A TO Z: A DICTIONARY" by Richard R. Lingeman, xvii + 277 pp., McGraw-Hill Book Co., 330 W. 42nd St., New York 10036. 1969. \$6.95.

This small volume is both interesting and contemporary, and will answer with useful information some of the questions that come up nowadays so often. For an instance, it is very difficult to readily obtain information on the properties and uses of morning-glory seeds. I know this because I made a brief search of my library books and found very little. Turn with me to "Drugs from A to Z" (pages 171 to 173) and you will find a rather useful account of this "new" hallucinogenic, with mention of course of the related "ololiuqui". - Following a brief introduction, there come 200 pages of dictionary from A to Z, including many slang expressions that are often difficult to find defined (ex. cop, cook up, corrine, etc.). Follow four appendixes: (1) "nonsynthetic derivatives" of opium, morphine, and cocaine". (Error: some are synthetic, such as dihydromorphinone); (2) generic names of synthetic opiates; (3) generic and trade names of barbiturate, amphetamine, and combination drugs (Drug Abuse list); (4) miscellaneous drugs of potential danger. All lists except No. 1 are in alphabetic order. - In the introduction (p. xiv), mention is made of some synthetic morphine substitutes; one, "laterine". I could not find either in this Dictionary or in any of my reference books. Some omissions were noted: jive, liamba; mata cachorro (Amazon area); takrouri (Cannabis ?); pantagruelion (Cannabis ?).

GMH

"RELATIONSHIPS OF TREES OF THE LUQUILLO EXPERIMENTAL FOREST", by E.L. Little, Jr., Chap. 3-B/In ODUM, H.T. and PIGEON, R.F. (eds.): A tropical rain forest; a study of irradiation and ecology at El Verde, Puerto Rico. - U.S. Atomic Energy Commission, Washington, D.C. 1970.

A total of 207 species of native trees in 133 genera and 55 plant families are found in the Forest; 50 additional tree species have been introduced. The native trees are classified into 9 geographical groups. Ca. 2/3 grow wild somewhere on the

North American continent and over 25% are also found in both Central and South America. 30% are native to other islands of the West Indies but do not reach the continent. The closest relations are with Hispaniola and Cuba. South America seems to be the main source of the original immigrants. Nearly 30% are restricted to Puerto Rico (61 species) and are of particular interest in studying plant relationships and evolution; included among these are 26 species endemic to the Luquillo Mountains or slightly beyond.

GMH

"HERBIZIDE UND IHRE RUECKSTAENDE" (Herbicides and Their Residues) by Hans Maier-Bode, 479 pp., 189 tabs., 41 figs., linen, Verlag Eugen Ulmer, Postfach 1032, 7000 Stuttgart 1, Germany. 1971. Price: DM 80.-.

The herbicides are of much interest in the world today and are frequently mentioned in news dispatches: for instance, the extensive use of these materials in South Viet Nam to destroy vegetation which shelters enemy troops; and the frequent mention of supposedly harmful effects on human beings, apparently first observed in Viet Nam. The author is Professor of Pharmacology at the University of Bonn, and 63 years ago (1908) his own father published in the same press a work entitled: "Die Bekaempfung der Acker-Unkraeuter"! Economics Councillor Fr. Maier-Bode was Director of the Information Office for Plant Protection and Plant Diseases in Augsburg. The two volumes, that one and the present by the son, have however little in common. While it is frequently stated that the herbicides are or may be hazardous, such a statement is really meaningless when one considers the large number of chemical substances of many different classes which are being used. In the special (second) part of this book, the author has considered in detail 66 compounds belonging to 10 chemical classes. These have been discussed both from the standpoint of his own researches and those of associates (which were previously unpublished) and from the extensive literature (there are ca. 1500 references in the bibliography). For each compound, there will be found detailed information on the physical-chemical properties of the compounds, their behavior in the soil and in plant and animal organisms, their degradative mechanisms, their acute and chronic toxicity for lower animals and man, their side-effects on the world of living things, the residues which remain on foods and harvested products following their regular application in agricultural practice, and the effects which may be expected to come from these residues. An annex to the text furnishes tabular summarizations of the data, including tolerances for herbicides allowed legally in various countries, oral toxicity of various herbicides, appropriate analytical methods to apply to various herbicides, annual applications of herbicides to agricultural areas of various countries during the years 1963-6, etc. Subject index. This book will be of interest to pest control

officials, toxicologists, pharmacologists, human and veterinary medical men, and chemists.

GMH

"NATIVE AND NATURALIZED PLANTS OF NANTUCKET" by F.C. MacKeever, (Edited by H.A. Ahles), xxviii 130 pp., Univ. Massachusetts Press, Munson Hall, Amherst, Mass. 01003. 1968. \$6.50.

Nantucket Island, about 50 miles in area, lies off the coast of Massachusetts of which it is a part. This catalog of species arranged the plants in alphabetical order of their families from Aceraceae, with two species of Acer, to Zosteraceae, with six taxa of Potamogeton and Ruppia. For each taxon, there are given the common name, native home, synonyms, flowering period, references (sometimes), and mention in previous books, including four on Nantucket's flora, also Fernald's Gray Manual. There are also additional notes with discussion. The collection number of the author's specimen in the N.Y. Botanical Garden is also given. There are an introductory text and the index. 526 species are represented (Pteridophyta and Spermatophyta) and a grand total of 610 taxa (including varieties, forms, and hybrids). The last preceding work on the Nantucket flora was E. Bicknell's "Ferns and flowering plants of Nantucket" (1908-1919). This would be a very useful manual for the botanical visitor to the Island and should also be of interest for the adjoining land areas.

GMH

"ABSTRACTING SCIENTIFIC AND TECHNICAL LITERATURE: an introductory guide and text for scientists, abstractors, and management," by Robert E. Maizell, Julian F. Smith, and T.E.R. Singer, xvii + 297 pp., many tabs., 40 figs., Wiley-Interscience, 605 Third Ave., New York 10016. 1971. \$14.50

Abstracting of books, brochures, and articles in journals has become constantly more important with the advance of science and technology; in fact, to a large extent this advance is dependent on the availability of abstracts - the key to the voluminous literature. This volume presents no history of the art and science of abstracting; however, we do know that this convenience extends back about a century in western countries and is parallel in its development to the outgrowth and flourishing of the various fields of science. This handbook should be of much utility to the person who prepares but also to the one who utilizes abstracts, especially those in the information field and those who operate computers. "Abstractors and abstracting are important" (to quote one heading) and this can be figured on a dollars and cents basis, since the salary of a full time researcher is high (\$20,000 a year for a chemist with Ph.D. and something like \$20.00 per man-hour). Time saved in literature searching is money saved. The monetary value of abstracting is

not matched by any cash return to the abstractor since many abstractors carry on their useful activities as an unpaid voluntary service (ex. Biological Abstracts) while others receive only a small return, properly denominated an honorarium. (It is said that in the Soviet Union, abstractors are well paid and can carry on this work as a regular profession rather than as a side line as it is in the United States). - In this volume, there are chapters on "user groups, clients, and audiences", managing abstract operations, selection of material for abstracting, the mode of writing the abstract, kinds of abstracts, exceptions and special cases, access to abstracts through indexing, in-house abstracting bulletins, the role of abstractor in literature searches; auxiliary services of abstracting organizations (such as translations), bridging the time gap with abstracts, evaluating abstractors and abstracting. There are also included useful lists of selected terms and abbreviations, references, and examples of actual published abstracts. It seems that there is an unnecessarily large sample of some minor types of abstracts (ex. Metal Abstracts, with 16 pp.). Both the beginning and the seasoned abstractor will find much of value in this volume.

GMH

"BIOLOGY OF ACETABULARIA" by J. Brachet and S. Bonotto (editors),
XV + 300 pp., 113 figs., 9 tabs., 7 pls. Academic Press,
New York 10003. 1970. \$10.00.

This is a report of the First International Symposium on Acetabularia organized jointly by the Université Libre de Bruxelles (Belgium) and the Centre d'Étude de l'Energie Nucléaire, Mol (Belgium) under the auspices of the European Communities (EURATOM) held in Brussels and in Mol, 18-20 June, 1969. The 86 participants are listed in alphabetic order. The chief interest of the symposium in this unicellular (acellular) green alga depended on the ability of that part of the cytoplasm separated from the part containing the single nucleus to continue growing and differentiating. These capacities are of course generally thought of as being under the direct control of the nucleus. There are papers on morphogenesis, biochemistry, ultrastructure, photosynthesis, and circadian clocks, and the effects of light and radiation. Cytoplasmic-nuclear relationships and the autonomy of the mitochondria and chloroplasts are considered in terms of molecular biology. There are chapters on regulatory problems in Acetabularia mediterranea (the best known species) and other A. species, RNA synthesis, a stable RNA "species" (strain) in A. mediterranea, cytoplasmic DNA, the effect of DNA synthesis inhibitors (hydroxy urea and ethidium bromide) on morphogenesis in the organism, the fine structure of gametes and zygotes, plastid structure and evolution of plastids, regulation of enzymic activity during morphogenesis of nucleate and anucleate cells, mechanisms of cell wall formation, ultrastructure of organism during formation of the secondary nuclei, effects of red and blue light on morphogenesis

and metabolism, photosynthesis in chloroplasts isolated from the alga, rhythmic regulation in the genus, amino acids incorporation by chloroplasts isolated from anucleate Acetabularia,

GMH

"THE PRIMITIVE THERAPEUTIC USE OF NATURAL PRODUCTS. A BIBLIOGRAPHY, by B.D. Martin. Self-published. - Pittsburgh, Penna. s.d. (1971).

The reference citations in this bibliography are arranged in the alphabetic order of the authors' names. Naturally, the scope is world-wide; the listing includes books, pamphlets, and journal articles. By "primitive" the compiler intends popular, primary, and not savage or untutored. Included are remedies used by primitive man centuries or millenia ago as well as primitive man of the present period; the literature is both ancient and modern. The bibliographic items are drawn from many different fields - pharmacy, medicine, chemistry, botany, anthropology, etc. The items listed are all available at the Library of Duquesne University, Pittsburgh, Penna., and are available for public use. 1491 numbers are listed. A skeletonized subject index covers the last few pages.

GMH

"THE MEDICAL MESSIAHS" by James Harvey Young. A social history of health quackery in twentieth-century America. Princeton University Press, Princeton, N. Jersey. XIV + 460 pp., 8 pls.: 1967. \$ 9.--

Congratulations, Professor Young, for an excellent work, a worthy successor to your "Toadstool Millionaires", which traced the history of proprietary medicines in the United States from the 1700's up to 1906, the year of enactment of the Pure Food and Drug Act. In the present work, the continuing defrauding of the American people is told as it is extended from 1906 up to the most recent times. It is disgraceful to the American nation that such false practices have succeeded and still succeed despite all the efforts made by people of good will to prevent them. However, there is improvement, even though slow, and such exposures as this one should do much to accelerate the improvements in medical formulation and labeling. "The truth shall make you free"--and perhaps also healthier. One of the most interesting chapters deals with Hadacol, which only a few years ago was sold very widely in the States and was advertised with claims for health which were out of all reason. The book is thoroughly documented by the use of footnotes on almost every page. The end-papers are interesting for their reproductions

of American Medical Association posters; however one would need a magnifying glass to read them. The book is an important contribution to the history of medicine and pharmacy in the U.S.A.

GMH

"PHARMACOLOGY AND THERAPEUTICS" by Ruth D. Musser and John J. O'Neill
Ed. 4, The Macmillan Company, 866 Third Avenue, New York 10022.
xx + 1033 pp., 47 tabs., many figs.: 1969. \$10.95

If a student would wish to have a textbook in which the important matters are stressed and with an effective classification of the subject matter, he should find this book of interest. It represents an unusually well written and well arranged text - systematic, clear-cut, with the essentials plainly given. The book has made effective use of headings, bold face type, italics, tables, figures, and also useful tabular information on the end papers (measure and weight equivalents, and Latin abbreviations). Each chapter is provided with good important references and a set of questions. One useful device is the gray bars bearing a list of the official preparations and dispensing units (sizes), which also serves to separate the various compounds. There are three useful appendixes: (1) general book references; (2) glossary of technical terms; (3) answers to questions in Chapter 4 (Pharmaceutical arithmetic review). After these, there is a useful index. Although essentially a nurses' textbook, it is actually appropriate for other medical fields, including medicine itself and pharmacy. Included in the text are 14 "sections", each with from one to eleven chapters, a total of 54 chapters in the book. The content follows: introductory; antibiotics and other chemotherapeutic agents; autonomic nervous system agents; central nervous system agents; peripheral nervous system drugs; cardiovascular drugs; urinary system drugs; hormones; metabolic agents; gastrointestinal agents; agents acting on skin and mucous membranes; parasitocides; drugs for allergy; enzymes; toxicology; biologicals. The first edition of this book appeared in 1958 with later editions in 1961 and 1965, in addition to which several supplements have also been issued. The book is well made with good binding, strong paper, clear printing throughout. It is a book well worth the price tag.

GMH

BOOK REVIEWS

Alma L. Moldenke

"TIMBER: Its Structure and Properties" by H. E. Desch, Fifth edition, xx & 424 pp., illus., Macmillan Ltd., London & St. Martin's Press, New York, N. Y. 10010. 1973. \$17.50.

This new edition of this dependable, much-used text and reference source of worldwide scope introduces metric units throughout except for not altering imperial units in direct quotes. Seven additions have been described and illustrated in the chapter on the more important commercial hardwoods. Re-evaluations of timber drying, including a 1970 method of dehumidifying now in commercial production, (2) superficial appearances of Merulius and Coniophora cubical breakdown, (3) composite wood products, (4) mechanical stress grading practical for commercial usage — add much of value to this new edition.

The reference value of this book would have been enhanced if page numbers were added for all entries after the trade or botanical names listed in Appendix I or II or even in the index.

"THE GENERA OF THE MESEMBRYANTHEMACEAE" by H. Herre, iv & 316 pp., illus., A. A. Balkema, Publisher, Rotterdam, P. B. 1675, Netherlands. 1973. Fl. 105 oversize.

Such a beautiful production! Taxonomic botanists should and probably will have access to this work, but professional horticulturists, succulent enthusiasts, ecologists, etc. may not learn of its existence unless it becomes advertised by some U. S. distributor. The attractively accurate and partly colored illustrations by the Bolus Herbarium artists of the University of Cape Town, the excellent distribution maps for each genus, the well worked out keys, the careful taxonomic studies that have grown out of ample field and herbarium experiences, the valuable portraited biographical and bibliographic material, and the detailed descriptions of the plants on the 124 full-size color plates by the author who was a former curator of the Botanical Garden of the University of Stellenbosch in South Africa — all these are the main factors in making this book both a study of considerable scientific value and a presentation of great beauty.

"LOVE OF EARTH" by Herbert E. French, 314 pp., G. P. Putnam's Sons, New York, N. Y. 10016. 1973. \$7.95.

"Mankind has always been the most spendthrift creature of all, using up the limited treasures of the earth as if they will be end-

lessly available. Suddenly, he has begun to talk of recycling, of preserving, of conservation, of giving back some proportion of what he has been thus far overtaking most greedily."

This author, who previously shared with many readers the scientific wonders and beauty of the 70 percent of our globe in his "Of Rivers and the Sea" (1970), herein treats the dry 30 percent in similar interesting fashion under such topics as the birth of earth island, its stone and mineral treasures, forests, animals both wild and herded, farming and urbanization, humankind's connecting — yet marring — earthwide roads and better means (shank's mare) of enjoyment of our only earth. Good reading for scientist and non-scientist alike!

"BABOON ECOLOGY": African Field Research" by Stuart A. Altmann & Jeanne Altmann, viii & 220 pp., illus., University of Chicago Press, London & Chicago, Illinois 60637. 1973. \$4.95 paperbound.

"In general, our goal was to understand how the animals cope with the problems that they face in their natural habitat; toward this goal, we tried to obtain records that would be adequate, in terms of accuracy of observation, quality of description, and quantity of data."

"Although baboons are found in environments ranging all the way from moist, evergreen forest to semi-desert steppe, most of them live in the savannah habitat....Such plant associations cover much of the African continent. Thus, much of the abundance and wide distribution of baboons is the result of being successful in a predominant habitat....where they exploit a wide variety of plant and animal food sources, and feed selectively on some of the most concentrated sources of nutrients in their environment....without exposing themselves to excessive risks."

What a wonderful experience this couple with their infant, tent, Landrover, recorder, binoculars, alert and well trained minds, etc., must have had mostly in the Amboseli Game Reserve between July 1963 and August 1964.

This careful account has for its warp and woof interest and accuracy and is embroidered effectively, not superficially, with valuable diagrams, photographs and drawings as it reports primarily upon a specific troop of the yellow baboon, Papio cynocephalus L.

"FLORA OF WEST VIRGINIA" Part III, 2nd Edition, by P. D. Strausbaugh & Earl L. Core, pp. 577-877, illus., West Virginia University [Press] Bulletin Series 74 No. 2-1 August 1973, Morgantown, West Virginia 26505. \$3.25 each part paperbound.

The botanical leaders in this university have always been very conscious of the local flora.

Since the original edition of this work [1958] was very carefully

prepared for descriptions, illustrations, range, and keys, all that is needed in this new supply of books for the students is up-to-date taxonomy and county records and an invitingly beautiful color photograph of Rhododendron maximum, the state flower, on the cover.

This volume covers the flowering plants from the Linaceae through the Plantaginaceae. In reference to Verbena officinalis the cautious comment is made "Reported from 'W. Va.' by Gray's Manual, 8th ed., p. 1210, but we have no specimens." That record is probably based on two collections by Ritter Gustav von Guttenberg from Harper's Ferry in Jefferson County on August 24th and 28th, 1878.

"REVISION OF THE NOSTOCACEAE WITH CYLINDRICAL TRICHOMES: Formerly Scytonemataceae and Rivulariaceae" by Francis Drouet, v & 292 pp., illus., Hafner Press of Macmillan Publishing Company, London & New York, N. Y. 10022. 1973. \$14.95.

The taxonomic reduction of over 3,000 specific and infra-specific designations often placed in either of the two families mentioned latterly above into only 4 in a section of only one family might concern some readers as crass oversimplification if they were not familiar with the lifetime studies of this careful scientist-author. Almost all of the 1,700 nomenclatural types not destroyed by war, neglect, or isolation behind political barriers were studied, as were also axenic and xenic laboratory cultures under varied conditions, and field observations also under varied conditions, times and localities, to a total of 20,000 living and preserved specimens that were viewed microscopically.

"The morphology and physiology of trichomes of the blue-green algae alter continuously until the processes of growth or degradation have been almost or completely stopped by catastrophic physical or chemical changes of the environment or by thickening of cell walls...yet the only criteria of systematic value in this group are trichomatal characteristics."

Careful descriptions, drawings, indexing and substantiated disposal of synonymy are give for the accepted following four far-ranging species: Scytonema Hofmannii Ag., Calothrix parietina (Näg.) Thur., C. crustacea Schousb. & Thur., and Raphidiopsis curvata Fritsch & Rich constituting the Nostocaceae with cylindrical trichomes.

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BOTANICAL GARDEN

OXALIDACEAE EXTRA-AUSTROAMERICANAE

I. Oxalis L. Sectio Thamnoxya Planchon

Alicia Lourteig

Muséum d'Histoire Naturelle, Paris.

Abstract. This is the first paper of a series on extra South American Oxalidaceae that I intend to publish by Sections. My research has led me to revise a great number of specimens outside of the South American continent and therefore, some changes in the nomenclature and on the ideas of geographical distribution are the present result.

Oxalis L. Sectio Thamnoxya Planchon includes about 30 species most of them confined to South America. Only one, O. Barrelieri L. spreads out to reach Africa and the Pacific Islands. Two are endemics of the Antilles: O. pinetorum (Small) Urban in Cuba and O. scoparia Norlind ex Urban in Haiti. O. microcarpa Benthham and O. Dombeii Saint Hilaire from the tropical Andes reach Mexico along the Pacific slopes. O. frutescens L. a widespread species in Central and South America (including the Antilles) is composed of several subspecies based on old species names that I cannot keep in that rank. The following new combinations are established:

O. frutescens L. ssp. frutescens, chiefly for the Antilles,

O. frutescens L. ssp. pentantha (Jacquin) Lourt., comb. nov., for Venezuela mountains,

O. frutescens L. ssp. borjensis (H.B.K.) Lourt., comb. nov., for the savannas of Colombian-Venezuelian frontier (affluents of the Orinoco river),

O. frutescens L. ssp. angustifolia (H.B.K.) Lourt. comb. nov., for the S of Texas and Mexico to NW of Argentina and SE of Brazil.

The last taxon has much synonymy and is the most widespread one with large ecological variation; however no separation of any taxa can be maintained. Unfortunately, the name adopted by priority, represents only a reduced number of specimens growing under difficult conditions, in very dry soil: stems short, hard, tortuous, leaves crowded, very small, folioles lineal, rather thick and glaucous, almost glabrous.

La Sección Thamnoxya se caracteriza por poseer el raquis foliar desarrollado apareciendo los dos folíolos laterales opuestos alejados del terminal, y, las cápsulas turnantes. Exclusivamente americana, de regiones cálidas, cuya distribución geográfica va desde Texas hasta el NW de Argentina y el SE de Brasil, esta Sección comprende unas 30 especies de las cuales sólo seis habitan en Centro- y Norteamérica; O. Barrelieri es la única que se halla en otros continentes.

NOTA. No se cita la sinonimia exclusiva de Sudamérica.

Clave de las especies

- A. Cápsulas globosas, carpelos 1-seminados
- a. Fol. obovados a lineales
 - b. Pecíolos cilíndricos. Fol. obtusos. Cáps. globosas
 1. pinetorum
 - b'. Pecíolos ± alados. Fol. ± retusos. Cáps. globoso-aplanadas
 2. scoparia
 - a'. Fol. ovados, subagudos.....3. microcarpa
- B. Cáps. ovoideas u oblongas, carpelos pluriseminados
- a. Corola rosada, base blanca. Cáps. ovoideas, glabras
 4. Barrelieri
 - a'. Corola amarilla (a veces estriadas de rojo). Cáps. oblongas
 - b. Pls. glabras o con pelos largos, viscosos o glandulosos. Fol. glaucos con cistolitos blancos.....5. Dombeii
 - b'. Pls. ± pubescentes. Fol. ± pubescentes. Fol. forma variada, los laterales emarginados. Dorso carpelar generalmente piloso.....6. frutescens esp. angustifolia

1. Oxalis pinetorum (Small) Urban ⁺

Fig. 1 B

Urban, Symb. Antill. 5: 376.1908 Knuth, Pflreich.130: 74. 1930.

Lotoxalis pinetorum Small, N. Amer. Fl. 25(1): 49.1907.O. cajalbanensis Urban, Ark. Bot. 24 A (4): 12.1932.O. frutescens auct. cuban. (Grisebach, Sauvage) non L.!Tipo.Cuba, Isla de los Pinos, Santa Rosalía, leg. A.A.Taylor (154) 25 VI 1901 NY.

Herbácea (h. 40 cm) base subleñosa. Tallo erguido o recostado, glabro o con pelos cortos esparcidos, pubescencia densa en los ramos jóvenes. Internodios casi nulos (hojas subopuestas y pseudovercillos o sumamente aproximadas) y h. 4,5 cm. Follaje dimorfo, pero hay especímenes con un solo tipo de hojas sean las lineales o las otras. Pecíolos (h. 25 mm) finos, pubescentes. Raquis 1-2 mm. Peciolillos carnosos, purpúreos, pilosos ($\pm \frac{1}{2}$ mm). Folíolos en hojas inferiores elípticos a suborbiculares, obtusos (10-23 x $\frac{1}{2}$ -10 mm), en hojas superiores angostamente lineales, 1-nervados (8-20 x 2-5 mm), todos ciliados, con pubescencia sobre la nervadura media, raramente sobre las dos faces, ± glabrescente. Cimas erguidas terminales, largamente pecioladas (h. 8 cm), bifidas (ramas h. 25 mm), 7-31-floras. Brácteas ± púrpureas, ovado-acuminadas (± 2 mm); bractéolas (± 1 mm). Pedicelos glabros (3-4 mm) articulados cerca de $\frac{1}{4}$ de la base.

Sépalos verdosos, algo desiguales, oblongos o elípticos (2,5-4,5 x 1-2 mm), glabros, truncados, obtusos o subagudos, alguno en cada flor retuso. Pétalos amarillo-brillantes, obovados (10-12 mm). Estambres pilosos, los largos (2,5 mm, los cortos 1,5 mm, soldados h. $\frac{1}{2}$). Pistilos (± 4 mm); estilos pilosos, estigmas pequeños.

Cápsula globoso-apiculada (4-4,5 mm) glabra, cáliz de su largo; carpelos 1-seminados, interiormente glabros. Semillas (2,5 mm, inma-

⁺el epíteto alude a la localidad típica.

turas) ovoideo-aplanadas, agudas, 8-costadas, 10-12 estrías transver-sales notables.

Distribución geográfica. Endémica del oeste de Cuba, en savanas húmedas arenosas. V. carta 1.

CUBA. Leg. Wright 2177, 1860-64 BM, GH, K, MO, P, S. Prov. Pinar del Río, Herradura, Ekman 10682 10 IV 1920 S. Los Palacios, Ekman 10881, 17 IV 1920 S. Mantúa, Darmiji, Ekman 11066, 2 VI 1920 S, UPS. Pinar de Cajalbana, edge of brook, Ekman 17365, 28 VIII 1923 tipo O. cajalba-nensis, S. Pueblo Nuevo, leg. Ekman 17594, 9 X 1923 S. Herradura to Paso Real, Shafer 11775, 11 I 1912 MO, US.

Isla de los Pinos. Loma Daquilla, Ekman 12491, 2 XII 1920 S. SE corner of Cerro Daquilla to Sta. Isabel, Killip 43957, 12 IV 1954 US. S Santa Rosalía, A.A. Taylor 154, 25 VI 1901 tipo e isótipo NY. San Diego de los Baños, Rutten-Pekelhaaring 528, 2 VI 1933 U. Ca. 100 m, lb. Rutten-Pekelhaaring 612, 11 VII 1946 U. Leg. N. L. & E.G. Britton and Wilson 15111, 27 II-1 III 1916 US.

OBS. La mayoría de las flores son microstíleas; los estambres, en las pocas flores macrostíleas observadas son mucho más pequeños que en las otras flores.

2. Oxalis scoparia Norlind ex Urban +

Fig. 1 A

Urban, Ark. Bot. 17(7): 33. 1921. Knuth, l.c. 75-76. 1930.

O. trouiniana Urban, l.c. 20 A (5): 15. 1926. Knuth, l.c. 430.

Tipo. Haiti, Dep. du Sud, Port à Piment, leg. Ekman (339) 26 VI 1917 S.

Herbácea (h. 50 cm). Rizoma subterráneo. Tallos subterráneos en la base, erguidos, poco ramificados. Pubescencia corta, curva, subad-presa, esparcida. Ramos jóvenes pubescentes, glabrescentes, setas en la inserción de los pecíolos. Internodios inferiores h. 20 mm, casi nulos en los fascículos foliares y hacia el ápice; cicatrices de la inserción foliar esclerosadas. Hojas alternas, subopuestas y pseudo-verticiladas. Pecíolos rígidos (h. 40 mm), filodiales (0,2-0,7 mm ancho). Peciolillos carnosos (0,2-0,5 mm) pilosos. Folíolos obovado-oblongos (nervaduras secundarias poco notables) a lineales (1-nervados), truncados, obtusos o subretusos a veces mucronados (8-23 x 1,5-10 mm), pubescencia esparcida, haz a menudo glabro. Cimas ascendentes largamente pedunculadas (h. 8 cm) mayores que el follaje, glabras, bifidas, ramas erguidas (h. 30 mm), 2-35-floras. Brácteas subuladas, elíptico-lineales, acuminadas (\pm 1 mm) y bractéolas más angostas y menores. Pedicelos (1,5-2 mm) articulados cerca de la base, acrecido en el fruto (h. 4 mm).

Sépalos verdes, elípticos, anchos, agudos o subagudos, mucronados (2-2,5 x 1-1,5 mm), 3-nervados, glabros. Pétalos amarillos, obovados (ca. 8 mm). Estambres con filamentos anchos en la base, los

+ del Latín, por el aspecto de la planta que recuerda una escoba, ramas erectas, \pm rígidas fastigiadas.

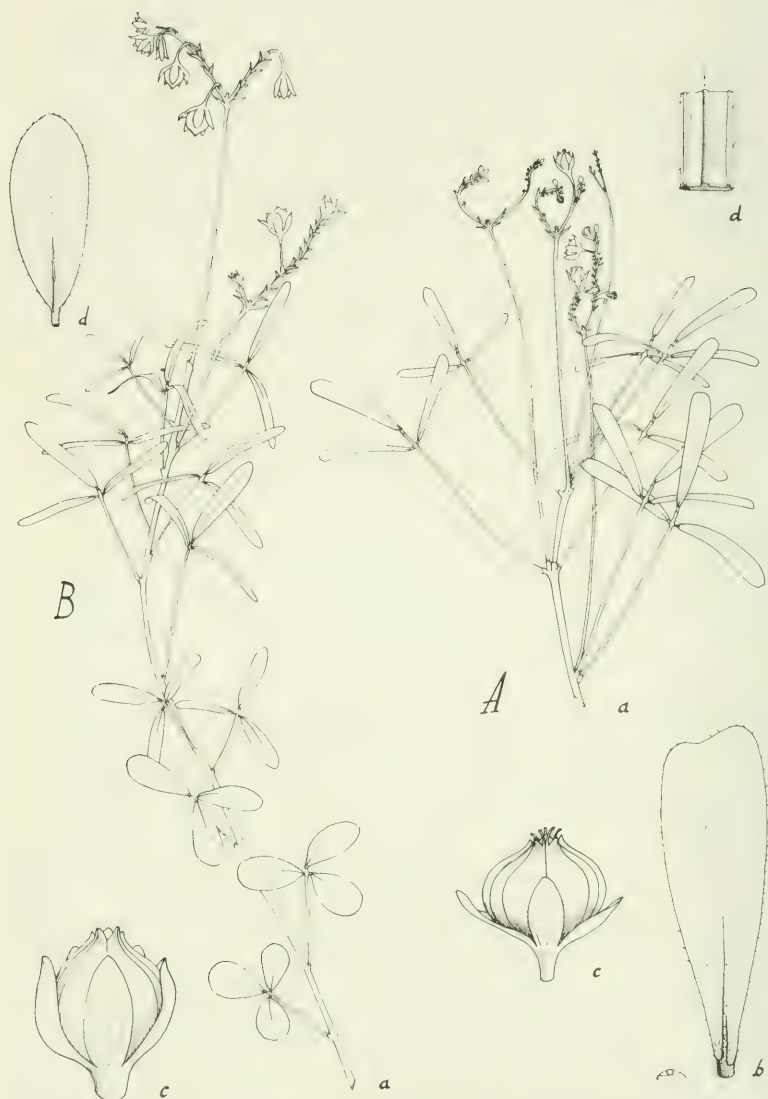


Fig. 1. A, O. scoparia: a, rama $\times 1$; b, envés foliolar $\times 3$; c, fruto con cáliz $\times 4$; d, pecíolo $\times 10$; Ekman 5864 S. B, O. pinetorum: a, rama $\times 1$; b, envés foliolar $\times 3$; c, fruto con cáliz $\times 4$; Ekman 11066 S. de Faul-trier del.

largos (0,6-1 mm) cortamente pilosos, los cortos (0,4-0,6 mm) glabros soldados h. $\frac{1}{4}$. Pistilos muy largos ($\pm 2,5$ mm); estilos glandulosos-pubescentes, ensanchados hacia el ápice; estigmas bifidos, papilosos; ovario esferoidal, carpelos 1-ovulados.

Cápsula esferoideo-agudas (prolongación de los ápices carpelares) glabras (± 3 mm); carpelos obtusos, ápice prolongado, 1-seminal, interiormente con pelos diminutos visibles sólo a fuerte aumento. Semillas pardas, ovoideo-asimétricas (1,5 mm), apiculadas, 8-costadas en zig-zag, estrías transversales algo irregulares.

Distribución geográfica. Endémica de Haití, en lugares sombreados y húmedos, sobre piedras calizas (limestone), en ríos pedregosos. V.

carta 1.

HAITI. Dep. du Sud, E La Hotte, in steep limestone hill at Chapel-le, Mont Carmel, ca. 1600 m, Ekman 2414, 7 XI 1924 S. Trouin, in limestone rocks at Rivière Coupe Oreilles, Ekman 2442, 10 XI 1924 tipo O. trouiniana S; isótipo UPS. Prope Port à Piment, in collibus altioribus, Ekman 339, 26 VI 1917 tipo S, isótipos A, GH. Massif de la Hotte, E. group, Grand Goave, road Carrefour-Fauché to Trouin, gorge of Rivière Coupe-Oreille, shaded limestone rocks, Ekman 5864, 15 IV 1926 GH, K, S, US.

OB5. El espécimen-tipo de O. scoparia es una planta de hojas más pequeñas y con expansiones más angostas que las del tipo de O. trouiniana; esta diferencia es sólo una variación ecológica, en todo lo demás son idénticos.

3. Oxalis microcarpa Benth⁺

Fig. 2 B

Bentham, Pl. Hartweg. 115. 1839. Knuth, l.c. 63-64.

Oxalis e Guayaquil Turczaninow, Bull. Soc. Imp. Moscou 31(1):427. 1858.

Tipo. Ecuador, prope pagum Zamboronton, leg. Hartweg III.... K.

Herbácea o subarborescente (h. 1,20 m) pubescente. Rizoma delgado (h. 4 mm diám.). Raíces fibrosas, ramificadas. Tallos erguidos, verdes o parduscos, finamente pubescentes; pubescencia fina, ondulada generalmente retrorsa y larga, hirsuta, blanquecina o amarillenta. Internodios 2,5-5,5 cm. Hojas alternas o subopuestas. Pecíolos filiformes, ascendentes (h. 4 cm), pubescentes, canaliculados, ensanchados en la base, pelos en la inserción. Folíolos desiguales, discolorados, ovados, elípticos o subromboidales (10-38 x 16-20 mm), obtusos o subagudos, pubescencia subadpresa, uniforme, glabrescente esparcida en el haz, más abundante en el envés, borde irregularmente ciliado; base cuneada o apenas cordada. Pedúnculos filiformes, semejantes a los pecíolos (h. 6 cm). Cimas bifidas 10-12-(40-)floras, ramas acrestadas en la fructificación (h. 6 cm). Brácteas lineal-acuminadas, bordes hialinos, hirsuto-pubescentes (1-1,5 mm). Pedicelos articulados cerca de la base (2-3 mm).

⁺ así llamada por la pequeñez de sus cápsulas.

Sépalos verdosos, ovados o elíptico-acuminados ($\pm 3 \times \frac{1}{2}$ -1 mm) o agudos o subagudos, bordes hialinos, a menudo con una cilia en el ápice, glabros. Pétalos amarillos (6-7 mm) obovado-subespatulados. Estambres largos ($\pm 2,5$ mm) ligulados por debajo de la mitad, glabros o pubescentes; los cortos (1,5-2 mm) glabros. Pistilo \pm del largo de los estambres mayores; estilos pilosos; estigmas ensanchados, 2-lobulados, capitados, papilosos; carpelos 1-2-ovulados, glabros.

Cápsula subglobosa (± 3 mm) glabra, cáliz \pm de su largo; carpelos membranosos, delgados, interiormente glabros, 1-seminados. Semillas pardas ($\pm 1,5$ mm), 8-costadas, estrías transversales profundas, pequeños tubérculos en la intersección con las costillas en zig-zag.

Distribución geográfica. Costa pacífica de Ecuador, Colombia, Panamá hasta México.

PANAMA. Canal Zone. Isthmus of Panamá, Punta de Carachine, Seemann 1063 XII 1847 K. Chagres, Fendler 25, II-IV 1850 K, US; 26, I-II 1850 GH, MO. Río Chagres, 1 mil. ab. Madden Lake, Duke 4475, 7 X 1961 MO, P. Madden Dam, Ebinger 876, 13 VIII 1960 US. Las Cascadas Plantation, near summit, Standley 29618, 4 I 1924 US. Fort Sherman, betw. Chagres Batteries and Fort S. Lorenzo, Maxon and Valentine 6991, 14 VI 1923 GH, NY, US. Forest along Quebrada La Palma and Cañón Hill, Woodson, Allen & Seibert 720, 18 VI 1938 F, GH, MO. Along banks of Río Indio, 70-100 m, Dodge & Allen 17381, I 1935 BR, K, MO, P. Waterfall of Boquerón, Steyermark and Allen 17230, 30 XII 1934 BR, MO, P, S, US. Prov. Panamá, Río Canita, near Jenine, Duke 3838, 23 IX 1961 MO. Darien, Mannene, Kirkbride & Bristan 1612 y 1572, 30 IV 1968 MO. Veraguas, S. Martín de Porre, 2-4 mil. N Santiago, Tyson 6059, 27 XII 1968 MO. Bayano Cuna, 2 mil. fr. Piria, 120 m, Duke 14359, 23 IX 1967 MO. Río Tapia, Standley 28075, 7 XII 1923-11 I 1924 US. Falls of La Chorrera, Lewis et al. 5198, 5 IV 1969 MO. Near confl. Río Pacora and Río Corso, 450 m, Duke 11955, 9 VI 1967 P. Darien Río Chico, fr. Yaviza at junct. with Río Chucunaque, Burch et al. 1192, 19 XII 1966 MO.

MEXICO. México. Distr. of Galeana Moreno, Camalote, 250 m, Hinton 14349, 26 VI 1939 GH, US, W. Distr. Temascaltepec, Luvianos, Hinton 3976, 25 V 1933 K. Anonas, 880 m, Hinton 4723, 19 IX 1933 GH, K. Ib., Hinton 4572, VIII 1933 GH, K, S, US. Bejuco, 610 m, Hinton 4143, 20 VI 1933 K. Galeana, Atoyac, 25-300 m, Hinton 14596, 9 VIII 1939 GH, US. Manzanillo, 10 Km fr., 30 m, leg. Worth, Morrison & Horton 8620, 8 VIII 1938 K, US. Ib., leg. Stork & Horton, UC. Comayagua, 1 Km S de la Misión, 1000 m, Molina 10938, 20 VII 1962 US. Entre Trincheras y Montañuelas, 1400 m, Molina 10883, 18 VII 1962 US.

Guerreño. Distr. Mina, dense Glade Palneres, 400 m, Hinton 9098, 16 VII 1931 K, UC. Vallecitos, Montes de Oca, Hinton 10359, 24 VI 1937 GH, K, S, UC, US.

Michoacán. Near Km 153, ab. 11 mil. fr. Arteaga to Playa Azul, 720 m, Moore & Bunting 8795, 12 IX 1961 UC, US.

Sinaloa. Near Coloma, Rose 3191, 13-20 VII 1897 US.

Oaxaca. Arrayán, 350 m, Makrinius 623, 12 VII 1926 US. San Miguel del Puerto pr. m. Pacific., Liebmann 71, XI 1942 S.

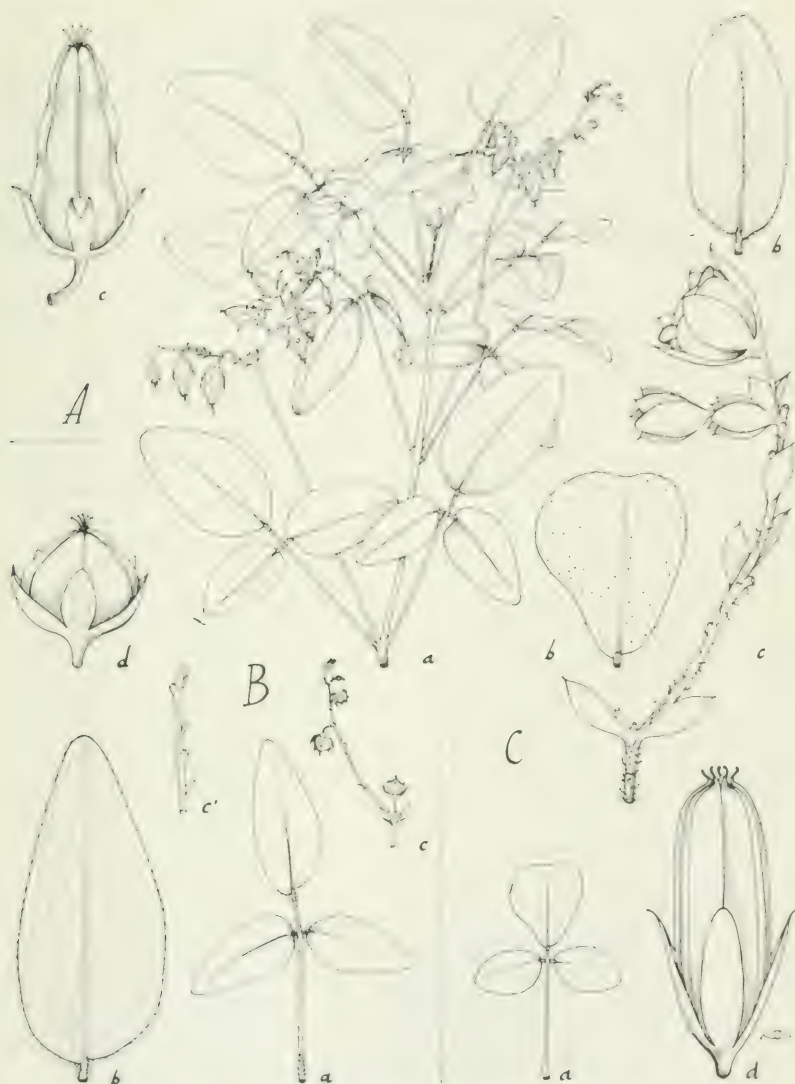


Fig.2. A, O. Barrelieri: a, parte de planta x1; b, envés foliolar x2; c, fruto con cáliz x 4; Amshoff 608 P. B, O. microcarpa: a, hoja x 1; b, folíolo (izq. envés, der. haz) x2; c, parte inflorescencia x1; c', detalle x 4; d, fruto con cáliz x4; Steyermark y Allen 17230 P. C, O. Dombeii: a, hoja x1; b, envés foliolar x2; c, parte inflorescencia x4; d, fruto con cáliz x2; D'Arcy 6057 P. de Faultrier del.

4. Oxalis Barrelieri L. ⁺

Fig. 2 A

Linnaeus, Sp. Pl. ed. 2: 642. 1763. Miller, Dict. 5: 374, 378. 1785. Jacquin, Monog. Oxal. 24, lám. 3. 1794. Candolle, Prodr. 1: 690. 1824. Zuccarini, Denkschr. Ak. Muench. 9: 173-4. 1825; Ib., ser. 2. 1: 258-260. 1831. Progel in Martius, Fl. Brasil. 12(2): 504-5. 1877. Knuth, 1.c. 65 p.p. Konker in Pulle, Fl. Surin. 3: 49-50. 1951 Lemée, Fl. Guy. Franç. 2: 164-165. 1952. Kabuye in Milne Redhead and Polhill, Fl. E.Afr. 2-3. 1971. Veldkamp in van Steenis, Fl. Males. 7 (1): 155, f. 1 f-g. 1971.

[Barrelier, Plant. rar. 64, lám. 1139. 1714].

Acetosella Barrelieri (L.) Kze., Rev. 1: 90, 92. 1891.

Lotoxalis Barrelieri (L.) Small, 1.c. 49.

Tipo. Lámina 1139, Barrelier, 1.c.

Erguida (h. 1 m) pubescente. Raíces fibrosas, ramificadas. Tallos verdes o ± violáceos, pubescencia amarillenta o blanca ± hirsuta, en parte retrorsa, ápices finamente blanquecino-hirsuto-pubescentes. Internodios de largo muy variado (h. 8 cm) a veces cortísimos apareciendo las hojas subopuestas. Setas en la inserción de los pecíolos. Pecíolos (h. 4 cm), ascendentes, ensanchado en la base, canaliculados, hirsuto-ciliados en los bordes. Peciolillos carnosos (ca. 1 mm), pilosos. Raquis (h. 15 mm) hirsuto-pubescente. Láminas discolores, envés ± glauco, forma y tamaño variados, suborbiculadas, oblongas, ovadas o elípticas (10-55 x 8-25 mm), obtusas, raro agudas, pelos ± largo esparcidos irregularmente en el envés, generalmente caducos, borde hirsuto-ciliados o sólo en la base; base aguda, redondeada o subpeltada, asimétrica. Cimas mayores que el follaje (pedúnculos h. 6,5 cm) pubescentes, bifidas, ramas h. 3 cm, 9-11-30-floras, laxifloras, paucifloras. Brácteas rojizas, lanceoladas o triangular-acuminadas (± 2 mm), pilosas. Pedicelos (h. 2,5 mm) articulados cerca de la base. Bractéolas más pequeñas adpresas al pedicelo, flores pequeñas, limbo de la corola rosado, fauce y base blanca o amarillenta.

Sépalos verdosos a veces estriados de rojo (3-3,5 x 1-1,5 mm), lineales a ovado-oblongos, agudos, mucronados, ± pubescentes, bordes hialinos. Pétalos obovado-subespatulados, unguiculados (7-9 x 3,5 mm) apenas emarginados. Estambres largos (ca. 3 mm) ± pubescentes o glabros, lígula ascendente ca. de la mitad; los cortos (1,5-2 mm) glabros. Pistilos 3,5 - 4 mm; ovario ovoideo, glabro, carpelos 3-4-ovulados; estilos pubescentes; estigmas ensanchados, bifidos, subcapitados, papilosos.

Cápsulas ovoideas (7-9 mm) membranosas, agudas, raro oblongas, glabras, cáliz de la mitad de su largo; carpelos 3-(2-4)-seminados, interiormente setoso-pubescentes. Semillas pardas, piriforme-aplanadas.

⁺ dedicada a J. BARRELIER (1606-1673) médico y padre dominicano francés que hizo la primera descripción y la ilustración de la especie (publicación prelineana) utilizadas por Linné.

das (1,5-2 mm), 8-costadas, estrías transversales profundas y pequeñas protuberancias sobre las costillas dispuestas en zig-zag.

Distribución geográfica. En lugares relativamente húmedos de las Antillas, América Central y Sudamérica tropical. Introducida en África y Asia tropicales y en algunas islas del Pacífico. V. carta 1.

PANAMA. Prov. Herrera, Road betw. Las Minas and Pese, 600 ft., Duke 12340, 14 VII 1967 MO. Prov. Panamá, 6 mil. E of Chepo, Duke 4065, 28 IX 1961 MO. Highway at Río Mamomi, ca. 4 mil. bey. Chepo, Duke 5573, 11 IX 1962 MO. Bocas del Toro, Zigla Road junction of Chanquinola and Tuibe rivers, Lazor et al. 2513, 18 IV 1969 MO. Road to "Bomba" Almirante, Blum 1316, 15 X 1965 MO. Cerro Jefe, in cafetal, D'Arcy 3968, 8 IV 1970 MO, P. Santa Rita Ridge, Lewis et al. 5245, 6 IV 1969 MO, P. Isthmus of Panamá, leg. Seemann BM, GOTT, K.

COSTA RICA. Prov. Limón, Los Diamantes on Río Santa Clara, 1,7 Km E of Quapiles, 200 m, Holm & Iltis 399, 11 VII 1949 A, K. Ca. 12 Km NW of Puerto Limón, Godfrey 66400, 12 II 1965 MO. Turrialba, 600 m, Mc Kee 11142, 3 I 1964 K, US.

GUATEMALA. Patulul, 250 m, Rodríguez 15, 26 XII 1920 P.

SANTO DOMINGO. Santo Domingo, in ditches at Guibia, llano costero, Ekman 11265, 21 I 1929 A, K, S, US. San Cristóbal, Lavastre 2187 18 VI 1966 NY. Ib., Türckheim 2530, X 1909 BR. Trujillo, R. & E. Howard 9964, 11 XI 1946 GH, NY, US. Río Basima, jungle, Fr. Augusto 1812, 21 III 1964 A, NY.

PORTO RICO. Ab. Trujillo, Alto Dam, Alein 9567, 22 VII 1962 NY. Wayside, Guavate, State Forest, 750 m, Lioquier 10360, 10 XI 1963 NY. Dist. Baramon, Otero 117, 1937 A, MO. El Yunque to Florida, Km 41, Wagner 12, 1-14 II 1963 A. Ib., Km. 19,3 Wagner 180, 13 IV 1963 A, U. Near Florida, Km 28,3, Wagner 516, 1 IV 1964 U.

COTE D'IVOIRE. Azaguié, leg. Akké Assi 9669, 11 VII 1967 K.

CAMEROON. Nkolbison, 8 Km W Yaoundé, Centre Agronomique, J. et A. Raynal 9507, 8 II 1963 P. N'efou, Nkolbisson, sentier, leg. Tankès Yves 1942, 10 VIII 1970 P. N'Kolbisson, 7 Km W of Yaoundé, 700 m, Leeuwenberg 6048, 2 VII 1965 K, P. WAG. Road to Yaoundé, 14 Km W of Nanga Eboko, 600 m, Leeuwenberg 5795, 8 VI 1965 K, P, WAG. Yaoundé-Mbalmayo, Sanford 5186, 13 X 1968 K. Ib., 17 Km de Yaoundé, Mezili 75, V 1968 P. Yaoundé, dans les fossés des rues, Jacques-Félix 9131, 17 XI 1967 K, P. WAG. Près Nanga-Eboko, bordure de route, Letouzey 5423, 16 VII 1963 P. Bertoua, 25 Km along road to Nnaga Eboko, Breteler 608, 5 XI 1960 A, FI, K, P, WAG. Mfomalen (19 Km E Nanga-Eboko), galerie de l'Éwé, J. et A. Raynal 12057, 30 XI 1964 P. Mbalmayo, bord de fossé en ville, J. et A. Raynal 10510, 15 III 1963 P. Douala, Bernardi 9044, 29 III 1962 K. Ib., Nyombe, 80 m, C.N.A.D. 2099, 29 IV 1972 P. Ab. 5 Km of Bertoua, ± 600 m, W. & B. de Wilde 3692, 13 X 1964 WAG.

UGANDA. Kampala, 4000 ft., Snowden 1787, IX 1930 K. Ib., 3850-3900, Chandler 1989, X 1937 K.

TANZANIA. Tanga Prov. Nuheza Township area, Amani Hill Station, Tanner 2279, 2 X 1955 K, UC. Amani Parish, Tanner 2742, 16 IV 1956 K, UC. Ib., Monga, Tanner 2736, 15 IV 1956 GH, K, UC. Lushoto Distr. Monga-Amani, E Usambaras, Drummond and Hemsley 3433, 23 VII 1953 K. Tanga Distr., Sigi, Amani, S. Paulo 818, 21 IX 1960 K. Mibngano, Sandford 25, XI 1956 K. Amani, Verdcourt 16, 2 I 1950 K. Amani to Derema, Ka-



Carte 1

buve 187, 29 VI 1970 K.

CEYLAN. Sabaragamuwa Prov., Ratnapura Dist., Kahawatta to Rakwana, 300 m, Hepper et al. 4560, 29 VI 1972 K, P, US. Ratnapura Dist., Dewalagawwa, 330 m, Cramer 3101, 14 VIII 1970 US. Ratnapura area, Cornanor 1126, 20 III 1968 US. West. Prov. Kalutara Dist. Maggona, Cramer 2980 20 V 1970 US. Kalutara Dist. Kolana, Cramer 2718, 17 X 1969 US. Kalutara Dist., Ellambawatta, Matugama, Balekrishnan 1015, 21 X 1971 K, US. MALASIA. Malakka, Singapore, Bot. Gardens, 70 ft., Purseglove 4044, 8 II 1955 A, L. Cluny Rd. Bot. Gardens, Mohd Shah 1035, 14 VIII 1965 A, L. Bot. Gardens, Furtado 9 XI 1927 UC. 7 Mil. Seremban to Kuala Lumpur, I. & P. 292, 8 VII 1870 K. Singapore, 200 ft., Cantley, 9 III 1886 K. Ib., Ridley 117, II 1889 K. Ib., Ridley I 1917 K. Ib., near Rogei Ridley XII 1920 K. Singapore Bot. Garden, Cluny Road, Shah 1035, 14 VIII 1965 LAE.

SUMATRA. N. Noeden, 15-20 m, Lörzing 1306, 17 III 1928 P. Arch. Ind. Banks, Muntol, \pm 20 m, Bünnemeyer 1342, 10 X 1917 L. Palembang Dist. Fjabon For. Res., near Muara Enim, Kostermans 567, 2 II 1956 K, L. JAVA. Bruysman 11, 21 III 1918 K. Batavia, 240 m, Bakhuizen 9 XI 1924 L. Ib., \pm 350 m, Bakhuizen 6060, 14 VIII 1927 L. Hort. Bot. Buitenzorg 250 m, Schiffner 2109, 23 XI 1893 GH, K, L. Ib., 260 m, Schiffner 2111



Carte 1

17 XI 1893 L. Ib., fl. Tjiliwong, Schiffner 2113, I 1894 L. Ib., Schiffner 2114, 21 XII 1893 L. Buitenzorg, Boerlage, 1888 L. Ib., Hal-liez 43 f y q, 21 1893 L. Ib., Koorders 31312 B, 16 IX 1898 L. Ib., ca. 240 m, v. Ooststroom 12557, 27 I 1950 L. Ib., v. Ooststroom 13630 15 IV 1950 L. Ib., Beatrixland, de Wit et Kraneveld 3949, 7 XI 1943 L. Bogor, Bot. Garden, Alston 12612, 3 XII 1953 K, L. Barenkok. z.v. Leuwiliang. W Buitenzorg, \pm 350 m, Bakhuizen 6860, 14 VIII 1927 K, P. Ib., Jeswiet 1404, 6 IX 1925 WAG. Ib., Kuntze 4376, 20 V 1875 NY. Bilimbing-Toempass, Coert 1210, 13 I 1935 A, L. Pogal, Coert 1418, 12 XII 1937 L. Bogor Depot, Soegandiredja 255, 1900 L. Bantardjaja Estate, 18 Km S of Rangkasbetung, Buwalda 2722, 5 V 1937 L. Bandoeng, Popta 163/36, 23 XI 1948 L.

CAROLINE ISLANDS. Ponape. Agric. Stat. Glassman 2839, 14 VIII 1949 US Ib., Glassman 2429, 2 VII 1949 US.

Palau Isl. Koror, Kanehire et Hatusima 4412, IV 1938 GH. Ngerebe'ed, Koror Isl, 10 m, E. & Evans 47433, 22 VIII 1965 US. Koror Isl., Blackburn 23, 20 XII 1966 US. Ib., Blackburn E9, 27 XII 1969 US. Ib., Blackburn E42, 15 XII 1966 US.

Yap Isl. W of Ngariy, 10 m, Fosberg 46309, 16 VII 1965 US. Dinay, Cushing 315, 30 VI 1965 US. Ib., 25 m, F. and Evans 502, 27 VII 1965 US S. of Yap High School, 0,5-0,7 mil. of Gitam, 50 m, Fosberg 46579, 27

VII 1965 US. Yap Group, 100 m, Hosaka 3303, 13 VII 1946 US.
 NUEVA GUINEA. Australian N. Guinea, E. Highlands, Taiora betw. Kainantu and Aiyura, 1490 m, v. Royen 4466, 9 VII 1954 L.
 Papua. Mesime, 200 ft., Gillison 22147, 30 XII 1964 L, LAE. Rouna, ca. 1500 ft., Carr 12487, 3 VI 1935 BM, A, K, L. 2 mil. E of Rouna, 1500 ft., Hartley 10622, 6 IX 1962 K, L, LAE. Sogeri, Bell 35, 24 III 1965 K. Sogeri-Rouna divide, 2000 ft., Schodde 2856, 30 VIII 1962 K, L, LAE. Sogeri, Hombron Bluff, 1740 ft., Womersley & Shaw 8824, 21 VII 1956 A, K, L, LAE. Sogeri Rubber St., Gray & Thorne 12557, 16 VI 1960 LAE, UC. Morresby-Sogeri Rd., 200 ft., Streimann & Kairo 51636, 11 V 1971 A, K, LAE Central Dist. Nurumai, ca. 12 Km N of Amazon Bay, Pullen 7610, 16 VI 1969 A, K. Sogeri Rd. near Rouna Lookout, 300 ft., Pulsford 143, 19 IX 1969 LAE.
 SAMOA ISLANDS. Upolu, Tanumalala, 200 m, McKee 3008, 13 VIII 1955 L. Upolu, Mt. Mangafalan, 450 ft., Sledge 1605, 8 II 1965 K, L. Upolu, near Alafua Coll., Whistler 711116-5, 16 XI 1971 US.

5. Oxalis Dombeyi Saint Hilaire ⁺

Fig. 2 C

Saint Hilaire, Fl. Bras. Mer. 1: 111.1825 ⁽¹⁾

O. Barrelieri auct. (Savigny, etc.) non L.!

O. darienensis Woodson, Ann. Miss. Bot. Gard. 27: 312-313. 1940.

Tipo. Perú, leg. Dombey, P.

Herbácea, erguida (h. 60 cm), glabra o poco pubescente en las partes jóvenes, cistolitos blancos presentes a menudo en brácteas, bractéolas y a veces en sépalos, o pubescencia larga, transparente (a veces ± viscosa). Rizoma delgado, cilíndrico, raíces fibrosas ± ramificadas. Tallo a veces subleñoso en la base (h. 6 mm diám.) a menudo con pelos glandulosos que pueden pasar desapercibidos si no hay secreción. Internodios 1,5-4 mm. Hojas alternas, subopuestas o pseudovecilladas. Folíolos laterales ± asimétricos, pecíolos (h. 4 cm) canaliculados, a menudo angostamente alados. Raquis h. 6 mm. Láminas oblongas, obovadas o suborbiculadas (9-25 x 5-22 mm), glabras o con finísimas ciliass y pelos sobre la nervadura en el envés; has con cistolitos blancos a veces muy notables; ápice obtuso o retuso; base subpeltada, apenas auriculada. Pedúnculos h. 6 cm. Cimas más largas que el follaje, bifidas, ramas largas, 10-25-floras, laxifloras (una rama puede abortar o presentarse acortada con las bractéolas superpuestas). Brácteas y bractéolas (± 3 mm y 1,5-4,5

⁺ dedicada a Joseph DOMBEY (1742-1794) médico, naturalista y etnógrafo francés que viajó en Chile y en Perú en donde recogió el tipo.

(1) En OBS. de la especie O. cajanifolia St. Hilaire.

(2) son los "petits points blancs" que Savigny describió en su "O. Barrelieri", lo que facilita la identificación de la especie.

mm, respectiv.) foliáceas, verdosas o estriadas de rojo, adpresas al raquis, subamplexicaules, lanceoladas, \pm acuminadas. Pedicelos (\pm 3 mm) glabros, raro pubescentes, articulados cerca de la base.

Sépalos verdosos, bordes hialinos, ovado-acuminados u oblongos (4,5-7 x 1-2 mm) glabros, agudos. Pétalos amarillo-anaranjados, ob-ovado-subespatulados (7-13 mm). Estambres largos (\pm 2,5 mm), pubescentes, lígula delgada notable, aguda, ascendente, en la mitad inferior; los cortos (\pm 1½ mm) glabros. Pistilos \pm 3 mm; ovario oblongo, carpelos h. 10-ovulados; estilos delgados, pubescentes; estigmas ensanchados, subcapitados.

Cápsula oblonga o elipsoidea (\pm 10 mm), cáliz h. $\frac{2}{3}$ de su largo glabra; carpelos 7-10-seminados, interiormente densa- y finísimamente pubescente. Semillas rojizas (\pm 1 mm), subpiriformes 5-6-costadas con protuberancias en zig-zag en la intersección con las estrías transversales.

Distribución geográfica. En dunas y terrenos áridos y salitrosos, raramente en terrenos de cultivo, de la costa pacífica y laderas del W de los Andes de Perú, Ecuador, Islas Galápagos y Panamá.

PANAMA. Prov. del Darien, Vic. Boca de Cupe, Allen 881, 5 X 1938 tipo O. darienensis MO, isótipos GH, NY, P, US. Río Chucunaque, Larsen 215 28 I 1962 G. Betw. Cana and Boca de Cupe, vic. of El Real along Río Pirré, Stern et al. 609, 16 VI 1959 GH, MO, US. Junction Río Peresénico and Río Pirre, D'Arcy (5531) 20 V 1971 MO, P. Ca. 4 mil. S of Canita, W. & J. D'Arcy 6057, 25 VII 1972 MO, P. Ca. 10 mil. S of El Real on Río Pirré, Duke 5371, 4 VIII 1962 MO, P. 2-3 mil. SE of El Real, Duke 4858, 18 VI 1962 MO, P. Río Chico, fr. Yaviza junction with Río Chucunaque, Burch et al. 1086, 19 XII 1966 MO.

6. Oxalis frutescens L.

non frutescens R. et P. nec Velloso!

Linnaeus, Sp. Pl. ed. 1: 435. 1753; ed. 2: 624. 1762. Miller, Dict. 5: 374. 1785 (ed. fr.). Savigny in Lamarck, Encyc. Méth. 4: 684. 1797. Thunberg, Diss. Acad. Upsalae Hab. 2: 77, 90. 1800. Poirét in Lamarck l.c. Suppl.: 252. 1816. Knuth; l.c. 73. 1930.

O. Plumieri Jacquin, Oxal. Amer. 23. 1794. Willdenow, Sp. Pl. 2: 801. 1799.

Acetosella frutescens (L.) Kze., l.c. 92.

Lotoxalis frutescens (L.) Small, l.c. 47-48.

[Oxys lutea frutescens Trifolii bituminosi facie Plumier, Cat. Pl. 2. 1703. Rajus, Hist. 3: 548 N° 8. 1704].

[Oxalis caule fruticoso, foliis ternatis Plumier, Pl. Amer. 207, lám. 213. 1755]. Urban, Rep. Sp. Nov. Beih. 5: 87, 174. 1920.

Tipo. Lámina de Plumier, basada sobre un espécimen recogido en Martínica.

Subarbusto o arbusto (h. 1 m) con tallo desnudo, foliado cuando los especímenes provienen de bordes de selva; folíolos suborbiculados a ovado-oblongos, glabros o con pubescencia laxa, fina \pm larga.

La especie varía morfológicamente según su ecología lo que justifica el elevado número de binomios creados durante más de dos si-

glos. Actualmente, las colecciones abundantes, de Centro y Sudamérica a pesar de ciertos "blancos" (grandes extensiones) que quedan aún sin explorar, permiten un estudio de las variaciones.

Pesando los caracteres y buscando relaciones posibles no puedo conservar con rango específico, binomios que corresponden a especímenes que, relativamente aislados geográficamente, presentan ciertas diferencias, por lo cual los he reducido a subespecies de O. frutescens L. Estas subespecies se habrían diferenciado por evolución adaptativa.

Aunque nomenclaturamente las combinaciones resultan dependientes de O. frutescens L., pienso que esas subespecies derivarían de una especie continental, probablemente de Sudamérica, mientras que O. frutescens L. ssp. frutescens se habría diferenciado, aislada en Antillas, continuación de la Cordillera de los Andes.

O. frutescens L. ssp. angustifolia (H.B.K.) Lourt. es la más abundante y la de mayor área de distribución; es la sola que retengo para Centroamérica. Lamentablemente, el tipo es una planta muy pequeña, mal desarrollada debido a condiciones ambientales adversas y que representa una minoría de especímenes; así el epíteto que lleva la prioridad resulta paradójico en su aplicación.

La distribución de esta subespecie sigue las pendientes de la Cordillera de los Andes en Centroamérica, las sabanas del norte de Sudamérica, E de Brasil, región chaqueña de Paraguay, Bolivia y NW de Argentina. Es indudable que faltan colecciones de ciertas regiones. No obstante, este caso confirma una vez más el paso de especies entre la Serra do Mar y la Cordillera de los Andes. EHRENDORFER, en sus estudios sobre Relbunium llega a esa conclusión especialmente con R. hypocarpium (L.) Hemsley; SLEUMER con Leucothoe, Gaylussacia y Gaultheria; L. B. SMITH con diversas especies de Bromeliaceae, para no citar más casos similares que constituyen ejemplos de migraciones tales como se citan en los Orígenes de la Flora de Santa Catarina (Cf. L.B.Smith).

Clave de las subespecies

- A. Tallos hirsuto-pubescentes (raro glabros), pelos curvos ± desiguales.
 - a. Arbusto o subarbusto ± rfgio. Fol. suborbiculados, ovados, obtusos, raro ± retuses; ciliados, glabros o ± pubescentes. Sápalo oblongos u ovado-oblongos, mucronados, con ciliás rfgidas.
 - a. frutescens
 - a. Hierba o subarbusto, pubescencia variada. Hojas alternas o pseudoverciciladas. Fol. lineales, elípticos, subagudos, u, ob-ovados ± emarginados; el central notablemente mayor, los laterales asimétricos ± profundamente emarginados. Sápalo elípticos o lineales, agudos, mucronados.....d. angustifolia
- B. Tallos ± adpreso-pubescentes (pelos finos), pelos hirsutos mezclados.
 - b. Arbusto o subarbusto. Hojas subcoriáceas generalmente "fasciculadas" en ramitas abortadas. Fol. elípticos, densa y finamente pubescentes. Sép. pilosos. Fr. dorso carpelar por lo común piloso.....b. pentantha

b. Subarbusto ramificado desde la base. fol. glaucos ± suborbiculados, oblongos u ovado-oblongos, glabros o pocos pelos sobre el nervio medio o pubescencia finísima muy corta casi invisible. Sépalos casi glabros. Carpelos por lo común glabros... c. borjensis

b. Oxalis frutescens L. asp. pentantha (Jacq.) Lourt. n. c.

O. pentantha Jacquin, Mon. Oxal. 21, lám. 1. 1794. Knuth, l.c. 61-62.

Tipo. Venezuela, Caracas, ex herb. Jacquin, W. Isótipo B, ex herb. Willdenow.

c. Oxalis frutescens L. sep. borjensis (H.B.K.) Lourt. n.c.

O. borjensis H.B.K., Nov. Gen. Sp. Pl. 5: 193. 1821.

Tipo. Colombia, in ripa fluminis Urinoci, pr. San Borja, locis humidis, umbrosis, leg. Humboldt et Bonpland (841) mayo, P. Isótipo B, ex herb. Willdenow sub O. fruticosa nomen!

6a. Oxalis frutescens L. asp. angustifolia (H.B.K.) Lourt. ⁺

Fig. 3

O. angustifolia H.B.K., l.c. 193. Candolle, l.c. 691. Zuccarini, l.c. 168. 1825; l.c. 247. 1831. Knuth, l.c. 75.

O. Neaei DC., l.c. 690. Zuccarini, l.c. 177; l.c. 262. Progel, l.c. Knuth, l.c. 71-72.

O. pilosissima Turczaninow, l.c. Progel in l.c. 501. Knuth, l.c. 71.

O. psilotricha Turczaninow, l.c. Knuth, l.c. 74.

O. tephrodes Turczaninow, l.c. Knuth, l.c. 73.

O. fasciculata Turczaninow, l.c. 32(1): 273. 1859. Knuth, l.c. 74. Ex descript. Tipo: Ghiesbrect 13.

O. Berlandieri Torrey, Bot. Mex. Bound. Surv. 41. 1859. Knuth, l.c. 72-73.

O. camporum Brandegae, Univ. Calif. Publ. Bot. 4: 377. 1913. Knuth, l.c.

O. Lindheimeri Torrey ex Knuth, Not. Bot. Gart. Berlin 7: 291. 1919 ex descript. Tipo: Purpus 3608.

O. stenomeres Blake, Contr. U.S. Nat. Herb. 24(1): 8. 1922. Knuth, l.c. 430.

O. glabrata (Baker) Knuth, l.c. 292. 1919; l.c. 75. 1930.

O. yucatanensis (Rose) Knuth, l.c. 291. 1919; l.c. 75. 1930.

O. praemorsa Willdenow ex Zuccarini, l.c. 1825 et Knuth, l.c. nomen in synonym.

O. occidentalis (Rose) Knuth, l.c. 75 in synonym.

Oxalis angustifolia (H.B.K.) Rose, Contr. U.S. Nat. Herb. 10: 115. 1906. Small, l.c. 48.

L. dichotoma Rose, L. occidentalis Rose, L. fasciculata (Turcz.), L. glabrata (Baker), L. Neaei (DC) Rose, l.c.

L. psilotricha Rose, L. tephrodes Rose, L. yucatanensis Rose, l.c. 116.

⁺ por la forma de los folíolos del especimen-tipo.

Acetosella angustifolia (H.B.K.) Kze., A. Berlandieri (DC.), A. fasciculata (Turcz.), A. Neaei (DC.), A. psilotricha (Turcz.), A. tephrodes (Turcz.) Kuntze, l.c. 92.
A. pilosissima (Turcz.) Kuntze, l.c. 93.

Tipo. México, Prope la Venta del Peregrino, leg. Humboldt et Bonpland (3906) P. Isótipo B, ex herb. Willdenow.

Subarbusto (h. 40 cm) o arbustito ramificado desde la base lefiosa, hirsuto-pubescente, ramas ascendentes o tortuosas o decumbentes. Raíz tortuosa a menudo gruesa (h. 7 mm diám.) ramificada. Hojas en pseudoverticilos muy acerdados o internodios largos (h. 5,5 cm). Tallos hirsuto-pubescentes, pubescencia muy variable y desigual, fina, larga. Pecíolos (10-40 mm) ascendentes pubescentes como el tallo. Raquis 0,2-10 mm. Folíolos verde glauco o \pm purpúreos, el central dos veces o más el largo de los laterales, elípticos, subagudos u obovados, retusos o emarginados (10-45 x 4-20 mm), los laterales asimétricos oblongos, emarginados, lóbulos obtusos o subagudos (4-20 x 1,5-10 mm), raro elípticos; pubescencia densa en ambas faces o haz glabrescente o glabro, algunos especímenes poco pubescentes, sólo sobre la nervadura media y con ciliás largas. Cimas algo mayores que el follaje (\pm 2,5 cm), 3-7 (11-15-) floras, ramas acortadas (\pm 1 cm) a veces una aborta, subumbeliformes. Brácteas (1,5 mm) y bractéolas (\pm 1 mm) lineal-acuminadas. Pedúnculos h. 3,5 cm. Pedicelos (\pm 5 mm) pilosos, articulados a \pm 1 mm de la base.

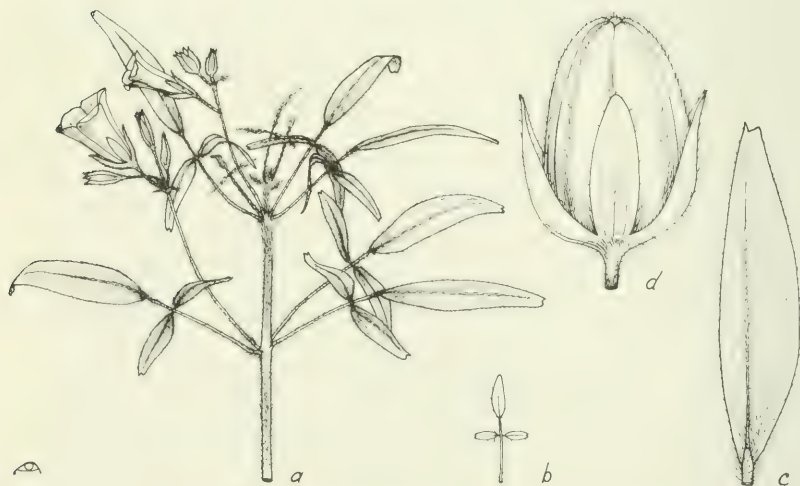


Fig. 3. O. frutescens ssp. angustifolia: a, parte de planta x 1; b, hoja x 1; c, folíolo (izq. haz, der. envés) x 2; d, fruto con cáliz x 8. b, Galeotti 3981, P; a,c,d, Hinton 9094. de Faultrier del.

Sépalos elípticos, agudos mucronados o lineales (3-5,5 x 1-1,5 mm) pilosos h. glabros, los internos \pm glabros, ápice ciliado. Pétalos amarillos 2 $\frac{1}{2}$ -3 veces el largo de los sépalos, obovado-unquiculados, apenas retusos. Estambres largos (\pm 3 mm) pilosos, lígula aguda ca. la mitad, los cortos (\pm 1,5 mm) soldados h. $\frac{1}{2}$. Pistilos 4,5 mm. pilosos; ovario ovoides; estilos pilosos, estigmas 2ífidos, capitados.

Cápsulas ovoides u oblongas (5-6 mm exc. cáps. con carpelos 1-seminados; raro 8 mm si carpelos 5-seminados), cáliz generalmente la mitad de su largo o h. 4/5; carpelos setosos en el dorso, interiormente cortísimamente pilosos, 13seminados (muy raro glabros). Semillas pa rdas (1,5-2 mm) ovoides-apiculadas, 8-costadas, 10-12 estrías horizontales, profundas, finas protuberancias en las intersecciones en zig-zag.

OBS. El tipo de *O. stenomeres* así como Jones & Proctor Facey 3116 y Dwyer et al. 440 son glabros (tallos y hojas) salvo las axilas foliares y los tallos muy jóvenes.

Distribución geográfica. En terrenos pobres, arenosos, pedregosos y sabanas y campos. Desde Texas en la frontera con México, América Central, N de Sudamérica, E de Brasil h. Río de Janeiro y hacia el W por Paraguay, Bolivia hasta el NW de Argentina (Tucumán, Catamarca).

"yerba de conejo", "agrillo", "comino", "nacillo" en Centroamérica, "chih-chakan", "toch-chakan" en México.

ESTADOS UNIDOS. Texas. Río Nueces, Berlandier 2524, lectotipo O. Berlandieri GH; isótipos K, P, US. Cerca del Río de las Nueces, Berlandier 1094, IV 1831 GH, K. Near San Antonio Viejo, sandy places, Schott 149 p.p. VI 1851 F. Pena, Wall, 10 VIII 1935 S. Ib., sand hills, Pringle 2407, 10 VIII 1889 BM, GH, K, NA, PENN, P, US. Ib., Nealley 289, 1889 US. Ib., Nealley 23, 1891 US. Ib., Nealley 98, VIII 1892 US. Cameron Co., Mifflin, Lewton 181, 13 IV 1905 NA, US. Riviera, Tharp 3510, 3 VII 1925 US. N edge of Hidalgo Co., 300 ft., Runyon 879, 17 VII 1925 US. 30 mil. S of Hebbronville, Tharp 6400, 15 VI 1928 US. Ib., 17 mil. E, Tharp, 25 VI 1941 GH. Brooks Co., S of Rachal, Sta. Fe Ranch, Lundell 14916, 21 IV 1949 GH, US. Brooks CO., Hamby 695, 5 IV 1940 NA. Kim Higg Co., Hamby 7273, 5 IV 1940 NA. Duval, E Crestonia, Barkley 13775, 19 IX 1943 NA. Kennedy Co., Yturria, C.L. & A.A. Lundell 8712, 6 V 1940 NA. Brooks, 6,4 mil Falfurrias, Cory 14699, 8 VI 1935 GH. Brooks, 2 $\frac{1}{2}$ mil. S Barroso, Cory 14172, 7 VI 1935 GH. New Mexico. Valley of the Río Grande, bel. Doñaña, Parry et al. (Boundary Comm. 133a or 1633 a?) GH.

MEXICO. Leg. Liebman 73, 1841-43 S. Mirador, Liebman 76, X 1841 US. Leg. Pavón, ex herb. Mociño y Sessé, BM.

Sonora. Paso Mayo, Wawra (Kais. Maximilian Reise) 857, W. Soledad, Wawra 157, W.

Sinaloa. Mazatlán, Ortega 7289, VII 1934 K, US. Ib., Rose, Standley & Russell 13825, 31 III 1910 US. Betw. Rosario and Concepción, Rose 3265, 27 VII 1897 tipo *O. occidentalis* US. Ib., Rose 1539, 6 VII

Along the Trinidad River near Liberty, Small & Wherry 11777, 11 IV pertenece a este táxon, según M. Johnston etiqueta errónea!

- 1897 US. Near Coloma, Rose 1650, 14 VII 1897 tipo Lotoxalis dichotoma US. Ib., Rose 3237, 21 VII 1898 US. Concordia, 546 m, Trejo 1080 IX 1919 US. Cerro Tecamate, W of Pericos, Scott Gentry 5757, 29 II 1940 GH, US.
- Nayarit. Sierra Madre, near Sta. Teresa, Territorio de Tepic, Rose 12 VIII 1897 US.
- Colima. Manzanillo, Palmer 1008, 2-18 III 1891 GH, K, US. Ib., near Cuyutlán, Ferris 6162, 28 XI 1925 GH, US.
- Mexico. Temascaltepec, Anonas, 880 m, Hinton 4574, 23 VIII 1933 BM, GH, K, S, US. Luvianos, Hinton 3976, 25 V 1933 BM.
- Tamaulipas. Aldama, Las Yucas, Dressler 1891, 19 VII 1957 GH. Ib., near Paso Lajas, Dressler 2331 b, 10 X 1957 GH.
- Puebla. Near Tehuacán, Rose & Hay 5911, 1, 2 VIII 1901 K, US. Ib., near Coxcatlán on Cerro Agujereado, 1000-18000 m, Smith et al. 3592, 3593, 3612, 3635, 3732 y 3751, VII 1961 US. Tehuacán, Purpus 1231, VI-VII 1905 GH. Ib., Galeotti 3999 A, VIII 1840 P. El Riego, Purpus 5855, VI 1912 BM, GH, US. Near Tehuacán, J.N. and J. S. Rose & Painter 9968, 30 VIII-8 IX 1905 US. Ib., J.N. & J.S. Rose 11248, 1 IX 1906 US.
- Veracruz. 20 mil. SE of Xalapa, Barkley et al. 2620, 3 VIII 1947 F. Cordillera, savanes, 3000 ped., Galeotti 3991, VI-X 1840 K, P, US, i' sdtipos O. tephrodes. Zacuapán, Linden 809, VII 1838 tipo O. psilotricha, isdtipo K. Ib., Purpus 7501, VII 1915 GH, US. Baños del Carrizal, Purpus 6038, VIII 1912 tipo O. camporum US. Isdtipos BM, GH, NY, US. Vic. of Pueblo Viejo, 2 Km S of Tampico, Palmer 536, 1, 2 VI 1910 BM, GH, K, US. Acayuyán, Ross 10, 3 VII 1962 US. Volc. Tuxtla, 2000 ft., Nelson 483, 13 V 1894 US. 2 Km Plan del río Jalapa, 300 m, Nevling & Gómez Pompa 46, VII 1967 GH. Coatzacoalcos, Isthmus of Tehuantepec, C. Smith 1062, IV 1895 GH. Veracruz, Houston a. 1730 BM.
- Orizaba. San Juan, Bourgeau V 1866 P.
- Guerrero. Montes de Oca, Petatlán, Hinton et al. 10329, 17 VI 1937 K, S. Pr. Venta del Peregrino, flum. Papagayo, Humboldt et Bonpland 3906 tipo O. angustifolia P. Isdtipo B. Acapulco, Née tipo O. Neesii, G; isdtipo B, K. 4 mil. of Acapulco, Barkley et al. 28, 20 VIII 1947 F. Puerta de Oro, 550 m, Hinton 9094, 15 VII 1936 GH, K, NY, S. Galeana, San Luis, chaparral, Hinton 10880, 2 XI 1937 GH, K, US. Mina, Pino, Hinton 10467, 17 VI 1937 GH, K, US. Acapulco & vic. Palmer 262 X 1894-III 1895 GH, K, US. Acapulco, dans le parc à charbon, Thiebaut 1145, P. Petatlán, Hinton 10329, 17 VI 1927 GH, US. La Calota-Acapulco, Langman 3353, II 1941 NA.
- Oaxaca. San Pedro Nolasco, 7500 pedes, Galeotti 3981, 1840 P. Côtes Pacifique, Cordillera, Galeotti 3984 p.p. IX 1839 P. Ca. Tehuantepec, Andrieux 480, IX-IV 1834 K, W. Ib., Andrieux 460, 1834 P. Ib., Orcutt 3330, 19 IV 1910 BM, K, US. Ib., Orcutt 6462, 19 IV 1910 US. Ib., Alexander 334, 13 I 1945 US. Ib., 10-12 Km E of Niltpec, Merrill King 1791, 18 VII 1959 US. 2-4 Km E Tehuantepec, to Oaxaca, Merrill King 1181, 1 VII 1959 US. 16 Km E Tehuantepec, 50 m, Merrill King 1382, 7 VII 1959 US. 10-12 Km E Tehuantepec, to Oaxaca, Merrill King 1223, 2 VII 1959 US. 2 mil. N Mixtequilla, 50 m, Merrill King 2881, 14 VI 1960 US. La Ventosa, 7 Km E Salina Cruz, ca. 50 m, Merrill King 2881, 14 VI 1960 US.

rill King 1261, 3 VII 1959 US. 4 Km NE Tehuantepec, 50 m, Merrill King 1316, 5 VII 1959 US. 13 Km NE Tenuantepec, Merrill King 1426, 8 VII 1959 US. 2 Km E Zonatepec, 50 m, Merrill King 1914, 21 VII 1959 US. 4-5 Km E Juchitan, Merrill King 1580, 12 VII 1959 US. Salina Cruz, 40 ft., Fisher 35304, 24 VIII 1937 S, US. Tomellin Canyon, 3000 ft., Pringle 4811, 31 VII 1894 GH,K,P,S. Tomellin Cañón Rose & Hough 4685, 24 VI 1899 US. Ib., J.N. & J.S. Rose 11324, 7 IX 1906 US. Ib., Pringle 4811, 31 VIII 1894 BM,US. Near Tomellin, J.N. & J.S. Rose & Painter 10036, 4,5 IX 1905 GH,US. Ab Lagunas, 850 ft., Nelson 2651, 5 VI 1895 US. Betw. Guichocovi & Lagunas, Nelson 2747, 27 VI 1895 US. San Gerónimo, 200 ft., Nelson 2765, 1-8 VII 1895 GH,US. Ib., Mell 2137, 7 X 1933 US. Juchitan, Rancho Las Anonas, Seler 1984, 2 II 1896 GH,US. Puerto Angel, Rexo 3806, 28 IX 1917 US. Ib., Morton & Makrinus 2606, 12 IV 1933 US. 3-4 Km W Ixtaltepec, 50 m, Merrill King 1510, 10 VII 1959 US. Cuicatlán, Cuesta de Quistepec, 1000 m, Conzatti 40281, 16 VII 1920 US. Cuicatlán, 2000 ft., Smith 509, 15 VII 1895 GH,US. Ib., 600 m, González 977, 16 IX 1899 GH. Santa Catalina, Rusby 28, 14 VII 1910 US. Dist. Tuxtepec, Chiltepec & vic. 20 m, Calderón 138, VII 1940-II 1941 GH, US. Dist. Tlacolula, pr. Zoquitlán, C. & D. Seler 75, VI 1888 GH.

Chiapas. Aguacate Palenque, Matuda 3820, 16-18 VII 1939 GH. Banks of Río Lagas, 4 mil. SW Soyalo, Breedlove 6560, 26 VII 1964 P. Sayatitlán R., 3 mil. NW Pinola, Breedlove 7090, 22 VIII 1964 P. Trapichito, near Comitán, 1350 m, Matuda 5662, 2 VI 1945 LL. Sierra de Tonalá, Picacho San Gerónimo, Purpus 6633, X 1913 BM,GH,NY,US, WAG. Hac. Monserrate Purpus 9233, IX 1923 NY. Ca. 30 mil. E Tuxtla Gutiérrez, 4600 ft., Webster 11694, 24 VI 1962 U. Ib., ab. 9 mil. E, Merrill King 2770, 9 VI 1960 US. El Chorreadero, 5,6 mil. E Chiapa de Corzo, 2500 ft., Laughlin 1121, 21 VI 1966 US. Honduras, near Siltepec, 1500 m, Matuda 4404, 9 VII 1941 A,US. San Bartolomé, Goldman 776, 22 III 1904 US. Petapa, Goldman 1022, 29 V 1904 US. Santa Margarita, Mell 2022, 15 III 1933 US.

Michoacán. El Muleto, Langlasse 213, 30 VI 1898 GH,K,P,US.

Yucatán. Izamal, Gaumer 715, VI 1895 tipo L. yucatanensis US. Isótipos A,BM,GH,R,P,S,UPS. Ib., Gaumer a. 1898 K. Chichankanab, Gaumer 1925 BM,GH,K,P,S,US. Mérida-Uxmal Rd. Km 40, E.L. & A.A. Lundell 8091, V-VIII 1938 US. Ib., Souza Novelo 82, VII 1939 MA. San Anselmo, Gaumer 1926, US. Chithen Itza, Bequaert 44, 7 VI 1929 A. BRITISH HONDURAS. S. d., Peck, 1905-7 GH. Belice. Cabbage Hall, ca. 1500 ft., Dwyer et al. 440, 21 III 1967 P. Belize-Cayo Rd., Gentle 9720, 17 IV 1950 LL. Near Minatee, Gentle 3410, 5 X 1940 GH. El Cayo, Chanek 212, 1933 K. El Cayo Dist., Augustine, Mt. Pine Ridge, Hunt 2, 26 VIII 1959 US. Cayo, Central Farm, Proctor 29623, 3 XII 1968 BM. El Cayo Dist. Mt. Pine Ridge, Mai Forest. Lookout, Hedger 212, 15 VIII 1866 BM. All Pines, 5 ft., Schipp 754, 10 V 1931 BM, Hattievile, Sorensen 7093, 18 VIII 1971 US.

GUATEMALA. Guatemala. Guatemala, Serre, P. Ib., 5000 pp. Shannon 4702, V 1892 GH, US. Ib., Sutton Hayes, VI 1860 GH. Barranca de Chimaltlá, 4000 ft., Donnell-Smith 2516, V 1892 K,US. Barranca del Zapote, Bernouilli 310, I 1866 K. Ib., Rodríguez 800, 1919 P. Concep-

ción, J.R. Johnston 545, 8 I 1937 P.

Santa Rosa. Santa Rosa, 3000 pp., Heyde & Lux 2991 V 1892 GH,K,MO, US.

Jutiapa. Atescatempa, 3000 ft., Heyde & Lux 6312, IV 1894 GH,K,MO, US.

Solola. Patulul, 250 m, Rodríguez 15, 26 XII 1920 P. Cocales, 250 m, Rodríguez 2131, P. Santa Bárbara, 1370 pd., Shannon 150, VIII 1891 US.

Suchitepequez. Las Animas, 650 ped., Shannon 232, IX 1891 US. Ib., 3-4 leguas fr. Mazatenango, Maxon & Hay 3449, 16 II 1905 US.

Retalhulen. Muluá, Kellerman 4985, 13 II 1905 US.

Quezaltenango. S. José de Buena Vista, Costa Cuca, 900 m, Rodríguez 351, 18 II 1920 P. Ib., Rodríguez 1803, 1 II 1920 P.

Huchuetenango. Nenton, C. & E. Seler 2952, 23 VI 1896 GH,US.

Escuintla. Escuintla, 1100 ft., Donnell-Smith 1981, III 1890 GH,K, MO,NY,US. El Baúl, 350-1000 m, Tonduz y Rojas 52, 3 III 1921 MO,US.

Hozelia, 1112 p., Morales Ruano 501, 1 VIII 1926 US. San Gabriel, 1900 m, Conzatti 329, 13 VI 1897 GH,US.

Baja Verapaz. Santa Rosa, 5000 ped., v. Türkheim 1440, IX 1888 GH, K,NY,US. Ib., 1600 m, v. Türkheim II 2309, VII 1908 US. Ca. Salama, 504, 1 XII 1924 US. Ib., Cuesta de Cachil, 1200-1600 m, Pittier 159

Petén. Tikal Nat. Park, Bajo de Santa Fe, in pinal, Contreras 1259, 14 VII 1960 LL, S. Pop Rd., Km 5, Sta. Elena, Contreras 5515, 5 III 1966 P. La Libertad, Lundell 3615, 4 VI 1933 K,NY,S,US. Tikal, 5 Km Sta. Elena, Tun Ortiz 518, 4 I 1970 P. Santa Elena a S. Andrés, Km

18, Tun Ortiz 1160, 28 V 1970 BM,MO.

Izabal. Gualán, 620 ft., Deam 6321, 17 VI 1909 GH,MO,US. Ib., 420 ft., Deam 13 I 1905 GH. Vic. Lago Izabal to Los Mariscos, 600 m, Jones, Proctor & Facey 3116, 26 IV 1966 U. Los Amates, Blake 7309, 9 V 1919 US. Ib., to Izabal, Blake 7791, 31 V 1919 tipo O. stenomeris US. Cristina, Blake 7638, 23 V 1919 US. Santa Lucía, O. & I. Degener 26483, 19 IX 1959 US. Chiché, Lundell 3714, 8 VI 1933 S.

HONDURAS. El Paraíso. Galeras, 830 m, L.O. Williams & Molina 10213, 4 VIII 1946 A,MO. Sierra El Chile, entre El Junquillo y El Robledal Quebrada El Coyol, 1300 m, Molina 14179, 12 VI 1964 US.

Atlántida. Lancetilla Valley, near Tela, 20-600 m, Standley 53058, 6 XII 1927-20 III 1928 US. Betw. Tela and Lancetilla, 80 ft., Yunker 4637, 18 VII 1934 MO. Vic. Tela, Mitchell 127, 3 VI 1926 GH.

Santa Bárbara. San Pedro Sula, 1000 pp., Thieme 5171, VI 1888 US,GH. Ib., Thieme 247, 25 IX 1887 F. Ib., Bangham 329, 11 VIII 1929 GH.

Morazán. Zamorano, 800 m, L.O. Williams & Molina 19363, 19 VIII 1946 A,MO, Ib., 2 Km S of EAP Campus, Pfeifer 1600, VIII 1960 US. Near Pedregal, 850 m, Molina 120, 14 VI 1947 GH.

Cortés. Cacholoma, 100 m, Molina 6674, 19 IV 1956 US.

Capital. Santa Inés, near Samarano, M. & J. Hernández 5133, 27 IV 1970 GH. Tegucigalpa, Barkley & Ertha 40692, 17 VI 1970 GH.

Choluteca. La Laguna, 450 m, Williams & Molina 10859, 17 XI 1946 GH. Marcos de Colón, Barkley & Ramírez 40514, 6 VI 1970 GH.

- *O. frutescens* ssp.
+ + + *angustifolia*
— *O. scoparia*
· · *pinetorum*



Carte 2.

Toledo. Dist. Monkey Riv. near Jenkins Creek, Gentle 4466, 21 IX 1942 GH.

Cosmaquaya. Vic. Siguatepeque, 1050 m, Yuncker et al. 5581, 1 VII 1936 GH, K, MO, S. Ib., 1080-1400 m, Standley 56252, 14-27 II 1928 US.

Copán. La Florida to Hac. Espíritu Santo, Blake 7402, 14 V 1919 US.

Dep. Gracias. Hjalmarson a. 1852 S.

Gulf of Fonseca, Legis Island, Sinclair a. 1847 BM, K. Pine Land at Los Dragos, 600 ft., Howard et al. 564, 29 VI-10VIII 1951 A, BM. 2, 5 Km W of Amapala, 10 m, Horton & Morrison 8856, 17 VII 1938 K, US.

Near Aguán Riv., below Coyoles, Yuncker et al. 8114, 29 VI 1938 MO.

Aguas Calientes, Deam 6130, 2 VI 1909 GH.

EL SALVADOR. San Salvador. Lenson 128, 280, 302, US. Ib., Hjalmarson a. 1853 S. San Jacinto, Velasco 8867, IV 1905 US. San Martín to Laguna de Ilopango, Standley 22514, 1 IV 1922 US. San Salvador, 650-850 m, Standley 23264, 30 III-24 IV 1922 GH, MO, US. Ib., Standley 19392, 20 XII 1921-4 I 1922 US. Ib., Standley 19560, 20 XII 1921-4 I 1922 GH, US. Vic. San Salvador, Standley 20447, 2-7 II 1922 GH, US. Ib., Calderón 819, 1922 US. Ib., Calderón 264, VI 1921 GH, US. Ib., Ciudad Universitaria, McKee 11354, 7 II 1964 P, US.

La Unión. La Unión, near coast, Grant 705, 11, 12 XII 1940 A, F. Nahuizalco, Hartman 66, 22 I 1968 S. Chonchagua, 1200 m, Wall 17 I 1928 S. Vic. La Unión, 150 m, Standley 20840, 13-21 II 1922 GH, US.

Sonsonate. Rd. to Cerro Verde, betw. Loma Chata and San Isidro, 800 m, Molina & Montalvo 21686, 25 II 1968 F. Vic. Izalco, 200-600 m, Pittier 1922, 14 II 1907 US. Ib., Standley 21806, 19, 24 III 1922 GH, US. Vic. Armenia, Standley 23437, 18 IV 1922 GH, US. Vic. Sonsonate, Standley 21993, 18-27 III 1922 GH, US.

Santa Ana. Vic. Santa Ana, 655-900 m, Standley 20437, 28-30 I 1922 GH, S, US. Vic. Metapán, ab. 370 m, Standley & Padilla 3310, 29 I-1 II 1947 F.

San Vicente. Vic. San Vicente, 400-500 m, Standley & Padilla 3475, 7-14 II 1947 F. Ib., Standley 21389, 2-11 III 1922 US.

San Miguel. Volcán San Miguel, finca Max Halmayer, 600 m, Tucker 969, 22 II 1942 K, P, US.

La Libertad. Vic. of Ateos, Standley 23379, 17 IV 1922 US.

NICARAGUA. Leg. Tate, a. 1867-8 K. Leg. Wright, a. 1853-6 P, US.

Managua. Betw. Managua and Sabana Grande, Greeman 5690, 27 II 1922 MO. Env. de Grenada, 40 m, Levy 101, VII 1869 P. Sierra de Managua 600-900 m, Garnier A 874, IV 1932 US. Vic. of Managua, Garnier A 1186, VIII 1932 US. Managua, Chaves 389, 8 IX 1929 US. Near Granada Maxon et al. 7469, 2 VII 1923 US. Ib., Mt. Mombache, 400 m, Grant 764, 23 XII 1940 GH. Casa Colorada S of Managua, 250 m, Maxon et al. 7454, 27 VI 1923 US. Momotombo, C. L. Smith 116, 28 V 1895 GH.

Chinandega. Chinandega, Baker 170, 13 I 1903 GH, MO. Ib., Baker 614 1903 US. Ameyá, Maxon et al. 7164 y 7116, 19-21 VI 1923 GH, US.

Masaya. Lake Masaya, Seymour & Atwood 3314, 11 I 1970 GH, BM.

Matagalpa. 5-10 Km W of Matagalpa, 600-700 m, L. O. Williams et al. 23768, 13 I 1963 F.

Carazo. Casa Colorada, Seymour 553, 12 XII 1968 GH.

Zelaya. Río Grande, Río Samuel, Molina 2292, 22 IV 1949 GH.

Lake Nicaragua, Ometepe Island, Shimek & C.L. Smith 50, 1893 US.

COSTA RICA. Leg. Serre, P. Llanos de Turócares, versant Pacifique,

Hacienda de Nuestro Amo, Pittier 16343, I 1902 US. Collines de Nicoya, Tonduz 13506, III 1900 BM, GH, K, P. Ib., Tonduz 13960, BM, US.

Nicoya, 200 m, Cook & Doyle 663, 22 I 1903 US. Bords du chemin de

Nicoya, Tonduz 13917, IV 1900 BM. Murciélago Bay, Howell 10214, 2

VII 1932 US.

Guanacaste. 5 Km N of Liberia, Burger 6118, 4 VII 1968 F. Bahía El

Coco, Bahía Playa Hermosa and Sardinal, 0-150 m, W.C. & M. Burger

7758, 29-31 VII 1971 F. Vic. of Cañas, Daubemire 151, 5 IX 1969 F.

Ib., Godfrey 67009, 11 III 1965 MO. Cañas Rd., 5 Km SE of Liberia,

Harris 83, 1966 F. 8 Km NE of Liberia, Harris 98 y 124, 1966 F. En-

tre Cañas y Bagaces, 100 m, Jiménez 974, 1 VIII 1963 F. Ab. 5 Km S

of La Cruz, 260 m, Weston 5011, 10 VI 1967 F. 5-15 Km S of La Cruz,

± 150 m, L.O. Williams et al. 26416, 1 I 1964 F. Bahía Santa Elena,

Río Guajiniquil, 50-200 m, L.O. Williams et al. 26724, 5 I 1964 F.

San José. Santa Ana, Hac. La Lindora, 810 m, Jiménez 220, 10 IX

1961 F. Quebrada de la Muerte, entre Santa Ana y Villa Colón, Jiménez 3510, 22 XII 1965 F. Puntarenas. Entre Mata de Limón y Cerro

de las Mesas, 60 m, Jiménez 713, 1 VI 1963 F.

Surubres. Près San Mateo, 200 m, Biolley 4048 III 1891 US.

PANAMA. Panamá. Near Playa Río Mar, 10-100 ft., Duke 11783, 3 VI

1967 MO, US. Near Río Mar, 5-20 m, Duke 12408, 13 VII 1967 MO. Pla-

ya near Río Mar, Ebinger 497, 19 VII 1960 F.

Bocas del Toro. Nievecita, Woodson & Schery 1029, 3-20 VIII 1940

tipo O. coccinea M8, isótipos NY, US.

Cocle. 4-6 Mil. E of Natá, 10-25 m, Duke 12402, 13 VII 1967 MO. Na-

tá, Seemann 1227, III 1848 K. Penohomé, Ebinger 996, 25 VIII 1960

F, MO. Río Grande, 10 mil. E Natá, Tyson 5277, 4 I 1969 MO.

THE TAXONOMIC POSITION OF ASPARAGUS L.

A. El-Gazzar* and A.A. Badawi**

Introduction

Asparagus is one of the largest genera of Liliaceae, with some 300 species concentrated in various parts of the Old World and characterized by the reduction of leaves into small scales or spines with groups of green assimilating cladodes in their axils (Airy Shaw, 1966). Because of this morphological peculiarity this genus was put in the same sub-family or tribe with Ruscus, Danae and Semele by all authors (e.g. Lindley, 1853; Bentham and Hooker, 1862 - 83; Krause, 1930; Rendle, 1953; Melchior, 1964) except Hutchinson (1934) who isolated Ruscus, Danae and Semele (with united stamens, extrorse anthers and inflorescences emerging on the surface or margins of cladodes) in a separate family (the Ruscaceae), thus leaving Asparagus as the only genus in his Liliaceae-Asparagoideae with free stamens, introrse anthers and inflorescences free from cladodes. In doing so, Hutchinson overlooked the numerous similarities between Asparagus and Ruscaceae on one hand, and the several dissimilarities between this genus and the rest of Liliaceae on the other. These dissimilarities have been recently regarded by Dahlgren (1974) as sufficient to justify the removal of Asparagus from Liliaceae to a mono-generic family, the Asparagaceae. In the course of a taxonomic study of Liliaceae sensu lato, novel evidence from the plants' characters has accumulated to decide where Asparagus fits best.

Material and methods

The widest concept of Liliaceae-Asparagoideae is that of Krause (1930) with 26 genera, four of which (Medeola, Paris, Scoliopus and Trillium) have been isolated as the Trilliaceae, and three (Ruscus, Danae and Semele) as Hutchinson's Ruscaceae. We have been able to procure specimens of 28 species representing 9 (Asparagus, Aspidistra, Clintonia, Convallaria, Disporum, Maianthemum, Polygonatum, Reineckea and Streptopus) of the remaining 19 genera of this sub-family, as well as fresh and herbarium material of 4 Ruscus spp. and 21 species from 10 genera representing the rest of Liliaceae sensu stricto, making a total of 53 species and 20 genera. Epidermal strips from mature leaves and cladodes were cleared in warm lactic acid, and semi-permanent pollen preparations were made according to the method of Franks and Watson (1963). Voucher specimens are kept at the herbaria of Cairo and Al-Azhar Universities.

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The characters and their taxonomic distribution

The following characters have been recorded comparatively for the species, and the results are given as Table 1:

1. leaves reduced to spines or scales + / not so -
2. cladodes present + / absent -
3. associated stomata present + / absent -
4. exine granulose + / smooth -
5. fruit capsule + / globose berry -
6. chromosome number (basic number for Gagea in parentheses)

The term 'associated stomata' is used here (after Chappet and Guyot, 1969) to describe the groups of two or more stomata whose guard cells are in direct contact with each other, and is synonymous with the term 'contiguous stomata' used by Gopal and Shah (1970) who found these stomata in the cladodes of 4 Asparagus spp. (A. gonoclados, A. plumosus, A. racemosus and A. sprengeri). All four species have been re-examined by us and the results are in full agreement with the findings of Gopal and Shah. However, to further ensure the reliability of the presence or absence of these stomata as a taxonomic character, several specimens of Asparagus officinalis (from Egypt, Finland, France and Switzerland) and A. aphyllus (from Egypt, Jordan and Libya) have been examined and all possessed this feature, indicating that it is constant for the species regardless of their geographical distribution. Furthermore, when these stomata are present they are sufficiently abundant not to be missed, thus obviating the need to determine their frequency relative to that of single stomata. The information in Table 1 has also been supplemented by data on the gross morphology of one species from each of Danae and Semele as given by Hutchinson (1969), while the chromosome counts (in column 6) are quoted from Darlington and Wylie (1955), Ornduff (1967 and 1968), Love (1973 and 1974) and Moore (1973 and 1974).

The facts in Table 1 speak for themselves: a correlation exists between the recorded characters so that the species fall into two clearly definable groups; Group I takes in all representatives of Ruscaceae and Asparagus from Liliaceae, and Group II incorporates the rest of Liliaceae. Members of Group I are characterized by reduced leaves, the presence of cladodes, associated stomata, globose berries, smooth exine and chromosomes constantly in multiples of 10, whereas those of Group II have green foliage leaves, no cladodes or associated stomata, loculicidal or septicidal capsules (rarely berries), granulose exine and chromosomes in multiples of 6, 7, 8, 9, 11 and 19. The multitude of chromosome counts scored for other genera and species of the two families are also in keeping with this finding, which shows that the present sample has not in any way been biased. This correlation between seemingly unrelated characters is further substantiated by the morphological variation in the subterranean stems of the plants (not shown in Table 1). Thus in all members of Group I these stems are sympodial rhizomes with conspicuous internodes, whereas in Group II they are mostly bulbous or short rhizomes carrying radical leaves.

Table 1. Comparative observations on 6 characters recorded for 55 species from 22 genera of Ruscaceae and Liliaceae sensu stricto. Columns 1 - 6 correspond with characters 1 - 6 in text respectively; column 7 shows the family to which a species belongs, L = Liliaceae, R = Ruscaceae.

species	1	2	3	4	5	6	7
Group I							
<u>Danae racemosa</u> Medic.	+	+			-	40	R
<u>Semele androgyna</u> (L.) Kunth	+	+			-		R
<u>Ruscus aculeatus</u> L.	+	+	+	-	-	40	R
<u>R. alexandrinus</u> J. Motte	+	+	+	-	-		R
<u>R. hypoglossum</u> L.	+	+	+	-	-	40	R
<u>R. ponticus</u> Woronow	+	+	+	-	-		R
<u>Asparagus abyssinicus</u> (A. Rich.) Hochst.	+	+	+	-	-		L
<u>A. albus</u> L.	+	+	+	-	-		L
<u>A. aphyllus</u> L.	+	+	+	-	-		L
<u>A. brachyphyllus</u> Turcz.	+	+	+	-	-	40	L
<u>A. crispus</u> Lam.	+	+	+	-	-		L
<u>A. falcatus</u> L.	+	+	+	-	-		L
<u>A. flagellaris</u> (Kunth) Baker	+	+	+	-	-		L
<u>A. gonoclados</u> Baker	+	+	+	-	-		L
<u>A. maritimus</u> (L.) Mill.	+	+	+	-	-		L
<u>A. medeoloides</u> Thunb.	+	+	+	-	-	20	L
<u>A. officinalis</u> L.	+	+	+	-	-	20	L
<u>A. plumosus</u> Baker	+	+	+	-	-	20	L
<u>A. racemosus</u> Willd.	+	+	+	-	-		L
<u>A. scaberulus</u> A. Rich.	+	+	+	-	-		L
<u>A. springeri</u> Regel	+	+	+	-	-	60	L
<u>A. stipularis</u> Forsk.	+	+	+	-	-	20	L
<u>A. tenuifolius</u> Lam.	+	+	+	-	-	20	L
<u>A. tetragonus</u> Bresler	+	+	+	-	-		L
<u>A. umbellatus</u> Link	+	+	+	-	-	20	L
<u>A. virgatus</u> Baker	+	+	+	-	-		L
Group II							
<u>Aloe arborescens</u> Mill.	-	-	-	+	+	28	L
<u>A. ciliaris</u> Haw.	-	-	-	+	+	42	L
<u>A. eru</u> A. Berger	-	-	-	+	+		L
<u>A. grandidentata</u> Salm-Dyck	-	-	-	+	+	14	L
<u>A. mitriformis</u> Mill.	-	-	-	+	+		L
<u>A. rossii</u> Tod.	-	-	-	+	+		L
<u>A. saponaria</u> Haw.	-	-	-	+	+	14	L
<u>A. spinosissima</u> Jahand.	-	-	-	+	+		L
<u>A. variegata</u> L.	-	-	-	+	+	14	L
<u>A. vera</u> L.	-	-	-	+	+	14	L
<u>Asphodelus microcarpus</u> Salz et Viv.	-	-	-	+	+	28,84	L
<u>Aspidistra elatior</u> Blume	-	-	-	+	+	32,36	L
<u>Chlorophytum comosum</u> Baker	-	-	-	+	+	28	L

species	1	2	3	4	5	6	7
<u>Clintonia borealis</u> (Ait.) Rafin.	-	-	-	+		28,32	L
<u>Colchicum autumnale</u> L.	-	-	-	+	+	36,38	L
<u>Convallaria majalis</u> L.	-	-	-	+	-	38	L
<u>Dipcadi erythraeum</u> Webb et Berth.	-	-	-	+	+		L
<u>D. serotinum</u> (L.) Medic.	-	-	-	+	+	8,10,16	L
<u>Disporum trachycarpum</u> (Wats) B et H.	-	-	-	+		22	L
<u>Gagea fibrosa</u> (Desf.) Schult.	-	-	-	+	+	(12)	L
<u>Gasteria lutzii</u> Poelln.	-	-	-	+	+	7,14	L
<u>Maianthemum biflorum</u> (L.) F.W. Schmidt	-	-	-	+	-	36,42,54	L
<u>Muscari racemosum</u> (L.) Mill.	-	-	-	+	+	36,45,54	L
<u>Polygonatum officinale</u> All.	-	-	-	+	-	20,26-30	L
<u>Reineckea carnea</u> Kunth	-	-	-	+	+	38,42	L
<u>Scilla verna</u> Huds.	-	-	-	+	+	22	L
<u>Streptopus amplexifolius</u> (L.) DC.	-	-	-	+	-	32	L
<u>Tulipa gesneriana</u> L.	-	-	-	+	+	24,36	L
<u>T. sylvestris</u> L.	-	-	-	+	+	48	L

Discussion

When the characters in common between members of Group I are added to the other similarities perpetuated in current taxonomic text-books (e.g. 2-ovuled locules, solitary seeds and confinement to the Old World) they decidedly outweigh the differences between them (in fusion of staminal filaments, attachment of anthers to filaments and the position of inflorescence), which induced Hutchinson (1934) to separate them in two different families, especially when it is realized that the genera in his Ruscaceae are not consistent among themselves in some of these respects: Danae (from Ruscaceae) resembles Asparagus (Liliaceae) in having inflorescences free from cladodes. It therefore seems reasonable to suggest that Asparagus (and consequently Hutchinson's Liliaceae-Asparagene) ought to be transferred to Ruscaceae. This view is in agreement with Dahlgren's (1974) idea of removing Asparagus from Liliaceae, but we have not been able to discover a sufficiently convincing correlation among the plants' characters to warrant the isolation of this genus in a separate family (Asparagaceae) as proposed by him.

According to Airy Shaw (personal communication) the name Asparagaceae (which is conserved) was proposed by Jussieu in 1789, long before the recognition of Ruscaceae Spreng., and must therefore be retained for the enlarged concept of the family (i.e. Ruscaceae + Asparagus).

Acknowledgements

We wish to thank Prof. Vivi Tackholm (Cairo University) for the generous loans and donations of herbarium specimens, and Miss. Badeea Diwan (Orman Botanic Gardens, Giza) for assistance with identification of some Aloe and Gasteria spp. Thanks are also due to Mr. H.K. Airy Shaw for advice on nomenclatural matters.

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ADDITIONAL NOTES ON THE ERIOCAULACEAE. LII

Harold N. Moldenke

PAEPALANTHUS GARIMPENSIS Alv. Silv.

Additional bibliography: Moldenke, *Phytologia* 29: 394. 1975.

The plate 162, cited in error by Silveira (1928), actually depicts P. fuscus Alv. Silv.

Citations: BRAZIL: Minas Gerais: Mendes Magalhães 2327 [Herb. Jard. Bot. Belo Horiz. 43381] (N), 2560 [Herb. Jard. Bot. Belo Horiz. 43865] (N).

PAEPALANTHUS GENICULATUS (Bong.) Kunth, Enum. Pl. 3: 521--522 & 573 [as "P. ? geniculatus"]. 1841; Körn. in Mart., Fl. Bras. 3 (1): 381. 1863.

Synonymy: Eriocaulon geniculatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625. 1831. Paepalanthus geniculatus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 293 & 381. 1863. Dupatya geniculata (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya geniculata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus paniculatus (Bong.) Kunth ex Moldenke, Résumé 327, in syn. 1959. Paepalanthus falcatus Gardn. ex Moldenke, *Phytologia* 25: 241, in syn. 1973 [not P. falcatus (Bong.) Körn., 1894, nor Körn., 1863, nor Mart., 1959].

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625, [pl. 21]. 1831; Bong., Ess. Monog. Erioc. 25. 1831; Bong., Mém. Acad. Sci. St. Pétersb., ser. 6, 5 (2): 21, pl. 31. 1839; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 521, 573, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 293, 381, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 10, 168, 170, [283], 285, & 290. 1903; Alv. Silv., Fl. Mont. 1: 407. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 35, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbonac., [ed. 2], 84 & 209. 1949; Moldenke, *Phytologia* 4: 144. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 98, 280, 288, 327, & 487. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 501, 583, & 952. 1971; Moldenke, *Phytologia* 25: 130, 131, & 241. 1973.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6,

5 (2): pl. 31. 1839.

Under a strict interpretation of the present edition of the International Code, Kunth's transfer of Eriocaulon geniculatum Bong. to the genus Paepalanthus is invalid because he did so with a question-mark, indicating doubt in his own mind. However, the transfer was certainly validated by Körnicke in 1863. Bongard's illustration cited as "Tab. XXI" does not appear ever to have been published, but probably is preserved in the Leningrad library or herbarium, unless, of course, it is the same as the plate 31 later published.

The species is based on L. Riedel 1064, collected "in glareosis subhumidis Serra da Lapa", Minas Gerais, Brazil, flowering in December, and preserved in the Leningrad herbarium. Kunth (1841) says of it "Nonnisi ob affinitatem cum praecedente [P. glareosus] huc relatus". Under P. glareosus he says "Sequenti affinis, distinctus statura humiliore, foliis radicalibus vagina brevioribus, patenti-diffusis et capitulorum bracteis exterioribus ovato-acutis, quae valde obtusae in P. geniculato."

Bongard's original (1831) description is "subacaule; foliis radicalibus linearibus obtusiusculis pilosis ciliatis; cauliculis subhorizontalibus foliosis; pedunculis adpresse pilosis; vaginis bifidis villosis".

Ruhland (1903) cites only the original collection and comments "Cum specie praecedente [P. glareosus] valde affinis, sed jam pedunculorum indumento et bracteis involucrentibus exterioribus, obtusis bene ab illa differt". Silveira (1928) cites A. Silveira 341, collected in the Serra do Cipó in 1905. The specific name is sometimes written with an uppercase initial letter for no valid reason. Mrs. Chase collected the species in "sand on open summit of serra", at 1400 meters altitude.

The Paepalanthus falcatus (Bong.) Körn. and P. falcatus Körn., referred to in the synonymy above, are synonyms of P. pedunculatus (Bong.) Ruhl., while P. falcatus Mart. is a synonym of Leiothrix flavescens (Bong.) Ruhl.

Additional citations: BRAZIL: Minas Gerais: M. A. Chase 10356 (W—1495688); A. P. Duarte 7798 [Herb. Brad. 27770] (Lw); Héringer & Castellanos 5963 (B), 6099 (Z); Murça Pires & Black 51-11846 (Z), 2801 (N, Z); L. Riedel 1064 [Macbride photos 10608] (B—iso-type, Br—iso-type, Br—iso-type, N—photo of isotype, N—photo of isotype, Ut—362—iso-type, W—photo of isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS GENTLEI Moldenke, N. Am. Fl. 19: 40—41. 1937.

Bibliography: Moldenke, N. Am. Fl. 19: 40—41. 1937; Moldenke, Phytologia 1: 333, 350, 351, 356, & 359. 1939; Moldenke, Carnegie Inst. Wash. Publ. 522: 144. 1940; Moldenke, Alph. List Cit. 1: 32 & 231. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 48. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 158. 1947; Moldenke, Alph. List Cit. 2: 334 (1948) and 3: 777. 1949; Moldenke, Known Geogr.

Distrib. Verbenac., [ed. 2], 36 & 209. 1949; Moldenke, *Phytologia* 4: 144. 1952; Standl. & Steyerl., *Feldiana Bot.* 24: 377—378. 1958; Moldenke, *Résumé* 43 & 487. 1959; Moldenke, *Fifth Summ.* 1: 82 (1971) and 2: 952. 1971.

The Gentle 992 isotypes cited below from the Cornell University, Lundell, and Montevideo herbaria were previously cited as duplicates in the Britton and University of Michigan herbaria from which they have been recently transferred.

Additional & amended citations: BRITISH HONDURAS: H. H. Bartlett 11874 (Id, Mi); Gentle 992 (F—699366—isotype, It—isotype, Id—isotype, S—isotype, S—isotype, Ug—isotype).

PAEPALANTHUS GIBBOSUS Alv. Silv., Fl. Mont. 1: 142—144, pl. 89. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 142—144 & 407, pl. 89. 1928; Wangerin in Just, *Bot. Jahresber.* 57 (1): 476. 1937; A. W. Hill, *Ind. Kew. Suppl.* 9: 199. 1938; Worsdell, *Ind. Lond. Suppl.* 2: 183. 1941; Moldenke, *Known Geogr. Distrib. Erioc.* 12 & 48. 1946; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 84 & 209. 1949; Moldenke, *Résumé* 98 & 487. 1959; Moldenke, *Phytologia* 20: 355. 1970; Moldenke, *Fifth Summ.* 1: 162 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 89. 1928.

This species was based by Silveira (1928) on A. Silveira 505, collected in April, 1908, "in campis, prope Contagem in Serra do Riacho do Vento, inter Diamantina, et Curvello", Minas Gerais, Brazil, and is deposited in the Silveira herbarium. He comments that the "Species ob sepala florum femineorum extus dense comata ab affinis P. arenicola Alv. Silv. excepta, certe distincta".

Thus far, P. gibbosus is known only from the type collection.

PAEPALANTHUS GLABRIFOLIUS Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 139. 1903.

Bibliography: Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 125, 139, & 290. 1903; Prain, *Ind. Kew. Suppl.* 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 181 & 407. 1928; Moldenke, *Known Geogr. Distrib. Erioc.* 12 & 48. 1946; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 84 & 209. 1949; Moldenke, *Résumé* 98 & 487. 1959; Moldenke, *Fifth Summ.* 1: 162 (1971) and 2: 952. 1971; Moldenke, *Phytologia* 25: 229. 1973.

Records of this species from Minas Gerais appear to be erroneous. Ruhland, in his original description of the species (1903), cites the type collection as from "Prov. Rio de Janeiro" and Glaziou's printed labels are so inscribed. The type locality is "auf Campos des Itatiaia, zwischen Felsen" and this locality is definitely in Rio de Janeiro. However, the type specimen in the Berlin herbarium has "Rio de Janeiro" stricken out on its label and "Minas" substituted in longhand. A letter from my good friend, Dr. G. F. J. Pabst, dated July 12, 1972, explains this as follows: "The border of the States Rio de Janeiro and Minas goes along the middle of the Serra da Mantiqueira. The Itatiaia re-

gion is in the Mantiqueira, with Pico das Agulhas Negras as the highest part. Collections are usually made in the area belonging to [the] State of Rio de Janeiro. Very, very few collections have been made on the Minas Gerais part of the Itatiaia hills. Campo de Itatiaia usually is called the high plateau better known as Planalto do Itatiaia (2400 msm), also in the State of Rio de Janeiro. The Minas Gerais part is difficult to reach and has nothing specially interesting, so seldom a botanist goes that way. It is the part you will find cited as Airuoca. Very nice Podocarpus lambertii formation can be seen there however. It is the side opposite to the ocean, thus rather drier, but it rains heavily in summer. It only does not get the constant humid sea winds. I would write without fear of error: State of Rio de Janeiro for whatever material is given from Itatiaia."

Silveira (1928) cites, in addition, A. Silveira 608, collected in the Serra do Itatiaia in 1913. Thus far, the species is known only from these two collections, and it has been collected in anthesis in November. Ruhland (1903) notes "Species P. glaucescenti et P. Erigeronti affinis".

Citations: BRAZIL: Rio de Janeiro: Glaziou 9001 [Macbride photos 10609] (B—type, N—photo of type, N—photo of type, W—photo of type, Z—isotype).

PAEPALANTHUS GLAREOSUS (Bong.) Kunth, Enum. Pl. 3: 521. 1841.

Synonymy: Eriocaulon glareosum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625. 1831. Paepalanthus glareosus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 292 & 299. 1863. Dupatya glareosa (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya glareosa Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Bong., Ess. Monog. Erioc. 25. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625 (1831), 3 (1): 555 (1835), and 3 (2): pl. 25. 1835; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 521, 573, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 292, 299, 380—381, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 168, 170, [283], 285, & 290. 1903; Alv. Silv., Fl. Mont. 1: 407. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41. 1930; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, 35, & 48. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98, 280, 288, & 487. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 501, 583, & 952. 1971.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 3 (2): pl. 25. 1835.

Bongard's original (1831) description of this species is "sub-acaulis; foliis radicalibus caespitosis patenti-diffusis brevissimis linearibus obtusis villosis; cauliculis subhorizontalibus foliosis; pedunculis retrorsum pubescentibus; vaginis foliis longioribus bifidis pilosis". It is based on L. Riedel 1043 from "in glareosis siccis Serra da Lapa", Minas Gerais, Brazil, and was collected in anthesis in November. Bongard comments that "Praecedenti [P. geniculatus] affine, a quo distinguendum: statura humilior; foliis radicalibus vaginis brevioribus patenti-diffusis et capitulorum squamis exterioribus ovato-acutis, quae valde obtusae in E. geniculato". Kunth (1841) repeats this same list of differences between the two species. Ruhland (1903) cites only the original collection. Silveira (1928) cites A. Silveira 494 from Serra Pouso Alto, Minas Gerais, collected in 1908.

Citations: BRAZIL: Minas Gerais: L. Riedel 1043 [Macbride photos 10610] (B—isotype, N—photo of isotype, N—photo of isotype, N—photo of isotype, Ut—363—isotype, W—photo of isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS GLAUDESCENS Körn. in Mart., Fl. Bras. 3 (1): 391. 1863.

Synonymy: Dupatya glaucescens (Körn.) Kuntze, Rev. Gen. Fl. 2: 745. 1891. Dupatya glaucescens Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 391 & 506. 1863; Kuntze, Rev. Gen. Fl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 126, 139, 142, [283], & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 12, 29, & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 98, 280, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 952. 1971; Moldenke, Phytologia 26: 482. 1973.

This species is known thus far only from the original collection made by Friedrich Sellow somewhere in eastern Brazil and deposited in the Berlin herbarium.

Citations: BRAZIL: State undetermined: Sellow s.n. [Brasilia] (B—type, Z—isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS GLAUCOPHYLLUS Alv. Silv., Fl. Mont. 1: 23—24, pl. 8. 1928.

Synonymy: Paepalanthus glaucophyllus Alv. Silv., Fl. Mont. 1: pl. 8, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 23--24 & 407, pl. 8. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 25: 241. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 8. 1928.

This species is based on A. Silveira 810 from "In campis siccis et saxosis inter Itacambira et Juramento", Minas Gerais, Brazil, collected in July, 1926, and deposited in the Silveira herbarium. Silveira (1928) comments that the "Species a P. fasciculifero Alv. Silv. pilositate foliorum et bractearum involucrentium praecipue differt." It is known thus far only from the original collection.

PAEPALANTHUS GLAUPODUS Alv. Silv., Fl. Mont. 1: 99--100, pl. 2 & 63 bis. 1928.

Synonymy: Paepalanthus glaucopodus Alv. Silv., Fl. Mont. 1: pl. 2 & 63 bis, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 99--100 & 407, pl. 2 & 63 bis. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 583 & 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 2 & 63 bis. 1928.

This species is based on A. Silveira 756, collected "In campis arenosis prope Milho Verde, in Serra Geral", Minas Gerais, Brazil, in June of 1925 and is deposited in the Silveira herbarium. Thus far it is known only from the original collection.

PAEPALANTHUS GLAZIOVII Ruhl. in Engl., Pflanzenreich 13 (4-30): 181, fig. 22. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 180, 181, & 290, fig. 22. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40 & 52. 1930; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Phytologia 2: 231. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 144. 1952; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 181, fig. 22. 1903.

This species is based on Glaziov 20016, collected among rocks at Biribiry, Minas Gerais, Brazil, flowering in April, and deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed. It is known thus far only from the original collection. Ruhland (1903) comments that the "Planta habitu valde insignis. Ramificatio pseudo-dichotoma non adeo pulchra ut in P. guianensi

vel dichotoma, cum interdum ramis tres in uno loco quasi inserti sint. Habitu minus compacto speciebus subsect. Polyactidis § Effusi haud dissimilis."

Citations: BRAZIL: Minas Gerais: Glaziou 20016 (B--type, Br--isotype, N--photo of isotype, Z--photo of isotype).

PAEPALANTHUS GLEASONII Moldenke, Known Geogr. Distrib. Erioc. 6 & 49, hyponym (Feb. 9, 1946), Phytologia 2: 140. July 8, 1946.

Synonymy: Paepalanthus robustus Gleason, Bull. Torrey Bot.

Club 58: 330--331. 1931 [not P. robustus Alv. Silv., 1908].

Bibliography: Gleason, Bull. Torrey Bot. Club 58: 330--331. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 200. 1938; Fedde in Just, Bot. Jahresber. 59 (2): 19. 1939; Moldenke, Known Geogr. Distrib. Erioc. 6, 49, & 53. 1946; Moldenke, Phytologia 2: 140. 1946; Moldenke, Alph. List Cit. 4: 985. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64, 66, & 209. 1949; Moldenke, Phytologia 4: 144--145. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 72, 75, 328, & 487. 1959; Moldenke, Résumé Suppl. 16: 6. 1968; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 125, 130, & 162 (1971) and 2: 589 & 952. 1971; Moldenke, Phytologia 25: 229. 1973.

This species is based on G. H. H. Tate 622, collected at the "Summit of Peak 7", Mount Duida, Bolívar, Venezuela, at an altitude of 7100 feet, and is deposited in the Britton Herbarium at the New York Botanical Garden. Gleason (1931) notes that "It is obviously closely related to P. convexus Gleason, but is much larger in all its dimensions; it is similarly closely related to P. subcaulescens Brown, which has broader leaves and much smaller heads." Recent collectors have encountered it at altitudes of 8500 to 9000 feet in Brazil.

Additional citations: BRAZIL: Roraima: Maguire, Murça Pires, & Maguire 60487 (N).

PAEPALANTHUS GLOBOSUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 143--144. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 126, 143--144, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 407. 1928; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

This species is based on Glaziou 15537, collected at Caraça, in the Serra de Capanema, Minas Gerais, Brazil, flowering in February, and deposited in the herbarium of the Botanisches Museum at Berlin. The original printed labels of the type collection are inscribed "Rio de Janeiro", but the locality of collection is definitely in Minas Gerais. Silveira (1928) cites A. Silveira 433 from the Serra do Batatal in the same state, collected in 1906. The species is thus far known only from three collections.

Citations: BRAZIL: Minas Gerais: Glaziou 15537 [Macbride photos

10611] (B—type, N—photo of type, N—photo of type, W—photo of type, Z—isotype); A. Lutz 1073 (Ja).

PAEPALANTHUS GNEISSICOLA Alv. Silv., Fl. Mont. 1: 124—126, pl. 77. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 124—126 & 407, pl. 77. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 77. 1928.

This species is based on A. Silveira 597, collected "In solo gneissicolo in Serra do Caparaó", Minas Gerais, Brazil, in April, 1913, and deposited in the Silveira herbarium. On page 407 of his work (1928) Silveira gives the collection date as "1911", but whether this is a typographic error or is meant to be a correction of the date given on page 126 is not clear. He comments that "A. P. caparoensi Ruhl. foliis obtusis bracteis involucrentibus acutis, appendicibus et stigmatibus praecipue differt".

Citations: BRAZIL: Espírito Santo: Irwin 2758 (N). Minas Gerais: Schwacke s.n. [Herb. Mus. Nac. Rio Jan. 29465] (N, S).

PAEPALANTHUS GOMESII Alv. Silv., Fl. Mont. 1: 67—69, pl. 39. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 67—69 & 407, pl. 39. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moacyr do Amaral Lisboa, Revist. Esc. Minas 9. 1951; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 26: 196 (1973) and 29: 313 & 314. 1974.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 39. 1928.

The type of this species was collected by Dr. Francisco de Magalhães Gomes in the Serra do Capanema, Minas Gerais, Brazil, in March of 1893. On page 69 of Silveira's work (1928) no collection number is given for the type collection, but on page 407 of the same work it is cited as F. M. Gomes 413. On page 69 what appears to be a second collection is cited as "in campis ex Serra do Batal, prope Capanema: Alvaro da Silveira, Apr. 1905; n. 413 in herbario Silveira". Silveira comments that the "Species cum P. erio-phaeo Ruhl. et P. Blepharophoro (Bong. Koern.) affinis, sed foliis glabris et bracteis involucrentibus paucis flavisque diversa".

Citations: BRAZIL: Minas Gerais: Macedo 2792 (N, S).

PAEPALANTHUS GONCALENSIS Alv. Silv., Fl. Mont. 1: 259—260, pl. 172 prim. [=171]. 1928.

Synonymy: Paepalanthus goncalensis Alv. Silv. apud A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938.

Bibliography: Alv. Silv., Fl. Mont. 1: 259--260 & 407, pl. 172 prim. [=171]. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Phytologia 20: 367 & 368. 1970; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 25: 241. 1973.

This species is based on Álvaro da Silveira 787, collected "in campis arenosis prope S. Gonçalo, inter Serro et Diamantina, in Serra Geral", Minas Gerais, Brazil, in June of 1925 and deposited in the Silveira herbarium. On page 407 of the same work (1928) Silveira records the type as "Silveira 787 prope S. Gonçalo do Serros 1926". It should also be noted that on page 260 of his work he cites plate "CLXXI", but the plate is actually numbered "CLXXII" and is the first of two plates so numbered. I am therefore citing it as "pl. 172 prim. [=171]". The true plate 172, which I am citing as "pl. 172 bis" represents P. barreirensis Alv. Silv. There seems to be no plate 173 at all. Silveira comments that the "Species ad affine P. homomallo (Bong.) Mart. foliis marginibus incrassatis et non canaliculato-revolutis praecipue differt".

Citations: BRAZIL: Minas Gerais: Black & Magalhães 51-11797 (Z), 51-11859 (Z); L. B. Smith 6833 (N, Z), 6837 (W--2120202).

PAEPALANTHUS GOUNELLEANUS Beauverd, Bull. Herb. Boiss., ser. 2, 8: 292, fig. 11 B 9--17. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291] & 292, fig. 11 B 9--17. 1908; Prain, Ind. Kew. Suppl. 4: 170. 1913; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 25: 229. 1973.

Illustrations: Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291], fig. 11 B 9--17. 1908.

This species is based on "Sans No. Itatiaya (Bresil) Sitio de Ramos, altitude 2000 m.: leg. E. Gounelle, fevrier 1899", deposited in the Herbarium Boissier at Geneva. This type locality has hitherto been regarded by me as in Minas Gerais, but according to a letter recently received by me from Dr. Pabst [see under P. glabrifolius] it is most likely in the state of Rio de Janeiro.

Beauverd (1908) comments that "Voisine des Paepalanthus acantholimon Ruhland et P. aretioides Ruhl. cette nouvelles espèce se distingue de ses deux congénères par ses capitules beaucoup plus petits et ses pédoncules rigides très tordus beaucoup plus courts que ceux du P. acantholimon (11 cm.) et deux fois plus longs que ceux du P. aretioides (3--4 cm); l'extrémité échancrée-cordée des sépales mâles et des pétales femelles lui assignant en outre une place à part dans le groupe des Rosulati

auquel elle sa partie, en portant dès lors à cinq des espèces qui en font partie."

Thus far it is known only from the original collection.

PAEPALANTHUS GRANATENSIS Körn. in Mart., Fl. Bras. 3 (1): 403--404. 1863.

Synonymy: *Dupatya granatensis* (Körn.) Kuntze, Rev. Gen. Pl. 2: 45. 1891. *Dupatya granatensis* Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 403--404 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 45. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 205--206, [283], & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 5, 30, & 49. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 67, 280, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 118 & 481 (1971) and 2: 952. 1971.

According to Körnicke's original (1863) description, the type of this species is Linden 2152, and this collection number is repeated by Ruhland (1903), collected in the vicinity of Bogotá, Cundinamarca, at an altitude of 2400 m., Colombia, flowering in March, and originally deposited in the Berlin herbarium. He cites also H. Karsten s.n. from the same locality, deposited in the Vienna herbarium. Allen collected the species at 11,000 feet altitude, also in Cundinamarca, while Hermann found it there at 2800 m., flowering in June, and describes his collection as a topotype collection.

Macbride's type photograph number 25169 is of Linden 1252 in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva. Apparently he regarded the "1252" on the label of this specimen as an error for the "2152" on the Berlin label. In this he is probably correct, and so I am regarding the Geneva specimen as an isotype.

Citations: COLOMBIA: Cundinamarca: P. H. Allen 3001 (W--1951927); Hermann 11352 (W--1906261); Linden 1252 [Macbride photos 25169] (N--photo of isotype, N--photo of isotype, W--photo of isotype), 2152 (B--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS GRAO-MOGOLENSIS Alv. Silv., Fl. Mont. 1: 133--134, pl. 83. 1928.

Synonymy: *Paepalanthus grão-mogolensis* Alv. Silv., Fl. Mont. pl. 83. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 133--134 & 407, pl. 83. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl.

2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 584 & 952. 1971; Moldenke, Phytologia 25: 241. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 83. 1928.

The type of this species is Álvaro da Silveira 805, collected "In cerrados, locis siccis, prope Grão Mogol", Minas Gerais, Brazil, in July of 1926 and deposited in the Silveira herbarium. Silveira (1928) says of it "Species a P. polygono Koern. pilis acutis, foliis primo ciliatis ac valde angustioribus et forma bractearum involucrentium praecipue differt." Thus far it is known only from the original collection.

PAEPALANTHUS GRISEUS Moldenke, Phytologia 2: 380, num. nud. 1947; Moldenke in Maguire, Bull. Torrey Bot. Club 75: 197—198. 1948.

Bibliography: Moldenke, Phytologia 2: 380. 1947; Moldenke in Maguire, Bull. Torrey Bot. Club 75: 197—198. 1948; Moldenke, Alph. List Cit. 3: 701. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 209. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 75 & 487. 1959; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 130 (1971) and 2: 952. 1971.

This species is based on Maguire & Fanshawe 23244, said to be "locally frequent" in damp sand on the Kaieteur Savanna, Guyana, collected on May 5, 1944, and deposited in the Britton Herbarium at the New York Botanical Garden. The collectors note that the "Leaves [are] erect, spreading, to 10 cm. [long]". The species resembles P. tatei Moldenke in habit, but is smaller in all its parts.

Citations: GUYANA: Maguire & Fanshawe 23244 (N—type).

PAEPALANTHUS GUSTAVII Alv. Silv., Fl. Mont. 1: 227—228, pl. 150. 1928.

Synonymy: Paepalanthus gustavii Alv. Silv., Fl. Mont. 1: pl. 150, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 227—228 & 407, pl. 150. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199, 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 584 & 952. 1971; Moldenke, Phytologia 26: 143. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 150. 1928.

This species is based on Álvaro da Silveira 744, collected in the Serra do Chapadão, Minas Gerais, Brazil, in April of 1925 and is deposited in the Silveira herbarium. On page 407 of his work (1928) Silveira adds the note that the type was actually gathered "prope Serra da Canastra". He comments that the "Species a cl.

Gustavo Amancio da Silveira, caro comite meo in itinere ad Serra do Chapadão, dedicada". Worsdell (1941) adopts the incorrect spelling of the specific epithet since it occurs on the illustration cited by him.

Thus far this species is known only from the original collection.

PAEPALANTHUS GUYANENSIS Klotzsch in Schomb., Reise Brit.-Guian.

3: 1064, hyponym [as "guianensis"]. 1848; Körn. in Mart., Fl. Bras. 3 (1): 347. 1863.

Synonymy: Paepalanthus guianensis Klotzsch in Schomb., Reise Brit.-Guian. 3: 1064, hyponym. 1848. Paepalanthus guyanensis Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 300. 1863. Dupatya guyanensis (Klotzsch) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya guyanensis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Schomb., Reise [Vers. Fauna & Fl.] Brit.-Guian. 3: 1064. 1848; Körn. in Mart., Fl. Bras. 3 (1): 277, 300, 347, & 507. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1023. 1883; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 5, 180, 181, & 290, fig. 21. 1903; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40, 42, & 51. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 6 & 49. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 209. 1949; Bourdu, Bull. Soc. Bot. France 104: 156. 1957; Moldenke, Résumé 75 & 487. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Phytologia 19: 35. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 130 (1971) and 2: 584 & 952. 1971; Moldenke, Phytologia 26: 253. 1973.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 180, fig. 21. 1903.

This species is based on an unnumbered collection by Richard Schomburgk from "auf sandigen Stellen in der Savanne, in der Umgebung des Rué-imeru-Falls", Guyana, flowering in September and October. On page 181 of his work (1903), Ruhl. spells the specific epithet "guianensi" [i.e., guianensis] although in all other places he adopts the spelling "guyanensis", the first validly published spelling. He cites Dupatya dichotoma Kuntze as a synonym, but I keep this separate as a synonym of Paepalanthus dichotomus Klotzsch, an obviously closely related taxon.

Gleason, in his unpublished Flora of British Guiana, describes P. guyanensis as follows: "Stems 3—7 cm. tall, freely branched, leafy throughout; leaves very crowded, erect or appressed and overlapping, narrowly linear, obtuse, hirsute; heads solitary

near the end of the branches, nearly or quite sessile among the leaves, 5 mm. wide; bracts oblong, appressed." He cites only the original collection and regards the species as endemic.

Citations: GUYANA: Rich. Schomburgk "A" (B--type, Z--isotype).
MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS GYROTRICHUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 132. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 6, 124, 132, 137, & 290, fig. 1 F. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 407. 1928; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 145. 1952; Moldenke, Résumé 98 & 487. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158 & 190. 1969; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 26: 191 (1973) and 29: 311. 1974.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 6, fig. 1 F. 1903.

This species was based by Ruhland (1903) on three collections: (1) W. Schwacke 8498 from "zwischen Diamantina und Formação, unter Felsen", flowering in April, (2) Glaziou 19986 from "Perpetua, bei Diamantina", flowering in April, and (3) Sena s.n. [Schwacke herb. 14555] from Serra do Cipó, flowering in June, all in Minas Gerais, Brazil, and all deposited in the Berlin herbarium. He comments that the "Species habitu P. myocephalo Mart. similis, sed plane ad eo diversa. Insignis praeter cetera floris pilorum forma. (Specimina jam destructa erant). Proxime ad P. pullum Koern. accedit, cujus forsán modo varietas est. Specimina a cl. Glaziou collecta paullo validiora pr. p. caule breviter elongato et ramuloso instructa sunt." Silveira (1928) cites one of his own collections from Diamantina in 1909.

Irwin and his associates found this species "in soil-filled cracks of outcrops in region of high campo slopes, outcrops, and creek margins" at 1400 m. altitude, flowering and fruiting in February. Williams & Assis found it on a campo, flowering in May: their 6864 is a mixture with P. exiguus (Bong.) Körn.

Additional citations: BRAZIL: Minas Gerais: Glaziou 19986 [Macbride photos 22282] (B--cotype, N--photo of cotype, W--photo of cotype); Irwin, Maxwell, & Wasshausen 20247 (N, N); Schwacke 8498 [Herb. Jard. Bot. Belo Horiz. 26661] (N--cotype); Sena s.n. [Herb. Schwacke 14555] (B--cotype); Williams & Assis 6864, in part (E--1309479, N).

PAEPALANTHUS HABENULIFER Alv. Silv., Fl. Mont. 1: 263--265, pl. 175. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 251, 263--265, & 407, pl. 175. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 &

49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 26: 193. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 175. 1928.

This species is based on Alvaro da Silveira 556, collected "In campis arenosis in Serra do Cipó", Minas Gerais, Brazil, in April of 1909 and is deposited in the Silveira herbarium. On page 407 of his work, Silveira (1928) gives the year of collection as "1905", but whether this is a typographic error or is intended as a correction of the date given with the original description is not clear. He comments that the "Species bracteis involucrantibus interioribus valde longis, habenulis imitantibus, et pilis supremis bractearum perigoniorumque mucronatis ac gibbosis ab affinis distinctissima."

Thus far this species is known only from the original collection.

PAEPALANTHUS HARMSII Ruhl. in Engl., Pflanzenreich 13 (4-30): 216. 1903.

Synonymy: Paepalanthus multistriatus Alv. Silv. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 214, 216, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 407. 1928; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 586 & 952. 1971.

This species is based on H. de Magalhães 1373, collected in damp places in the Serra de Ibitipoca, Minas Gerais, Brazil, in June, 1896, and deposited in the herbarium of the Botanisches Museum in Berlin, where it was photographed by Macbride as his type photograph number 10613. The type of P. multistriatus is H. de Magalhães 1371 in the same herbarium. Ruhland comments that the "Species colore et forma bractearum involucrantium ab affinis bene dignoscenda, cl. Dr. H. Harms dedicata." Silveira (1928) cites H. M. Gomes 268 from the same Serra de Ibitipoca, collected in 1896.

Citations: BRAZIL: Minas Gerais: H. Magalhães 1371 (B), 1373 [Macbride photos 10613] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS HEMIGLOBOSUS Alv. Silv., Fl. Mont. 1: 181--183, pl. 117. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 181--183, 186, & 407, pl. 117. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke,

Fifth Summ. 1: 162 (1971) and 2: 952. 1971; Moldenke, *Phytologia* 25: 161. 1973.

Illustrations: *Alv. Silv.*, *Fl. Mont.* 1: pl. 117. 1928.

This species is based on Álvaro da Silveira 783, collected "In campis arenosis inter Serro et Datas, in Serra Geral", Minas Gerais, Brazil, in June, 1925, deposited in the Silveira herbarium. On page 407 of his work (1928), Silveira gives "1926" as the date of collection of the type, but whether he intends this as a correction of his earlier statement or if it is a typographic error, is not clear. He also notes that this species resembles *P. bulbosus* *Alv. Silv.* [for differences between these two species see my discussion of *P. bulbosus* in this series of notes]. Of *P. hemiglobosus* he says "Species ob capitula magna, bulbis pilorum et pilis bractearum perigoniorumque acutis facile dignoscenda".

Thus far, the species is known only from the original collection.

PAEPALANTHUS HENRIQUEI *Alv. Silv. & Ruhl. ex Ruhl. in Engl., Pflanzenreich* 13 (4-30): 129. 1903.

Synonymy: *Paepalanthus henriquei* *Ruhl. ex Alv. Silv., Fl. Mont.* 1: 63. 1928. *Eriocaulon henriquei* *Alv. Silv. & Ruhl. ex Reitz, Sellowia* 7: 124. 1956. *Paepalanthus henriquei* *Alv. Silv. ex Moldenke, Résumé Suppl.* 1: 21, in syn. 1959.

Bibliography: *Ruhl. in Engl., Pflanzenreich* 13 (4-30): 123, 129, & 290. 1903; *Prain, Ind. Kew. Suppl.* 3: 126. 1908; *Alv. Silv., Fl. Mont.* 1: 58, 63, & 408. 1928; *Moldenke, Known Geogr. Distrib. Erioc.* 12 & 49. 1946; *Moldenke, Known Geogr. Distrib. Verbenac.*, [ed. 2], 84 & 209. 1949; *Reitz, Sellowia* 7: 124 (1956) and 11: 31 & 103. 1959; *Moldenke, Résumé* 98 & 487. 1959; *Moldenke, Résumé Suppl.* 1: 21 (1959), 4: 5 (1962), and 17: 10. 1968; *Reitz, Sellowia* 22: 51. 1970; *Moldenke, Fifth Summ.* 1: 162 (1971) and 2: 502 & 584. 1971; *Moldenke, Phytologia* 25: 241. 1973.

The type of this species was collected by Henrique Carlos de Magalhães Gomes (no. 1372) in the Serra de Ibitipoca, Minas Gerais, Brazil, flowering in June, and is deposited in the herbarium of the Botanisches Museum in Berlin, where it was photographed by Macbride as his type photograph number 10614. On the type specimen the binomial is credited only to Silveira.

Silveira (1928) cites *H. M. Gomes* 258, also from the Serra de Ibitipoca, collected in 1896 and this may possibly be part of the type collection. *Reitz* (1956) cites *Rambo* 49606 from Santa Catarina, Brazil, and records the vernacular names "capim manso", "capipoatinga", "gravatá manso", and "semprevivas do campo".

Ruhland (1903) comments that the "Species cum *P. eriophaeo* *Ruhl. valde affinis, sed statim pedunculis brevibus atque foliorum indumento differt.*"

Material has been misidentified and distributed in some herbaria under the name *Paepalanthus blepharocnemis* *Mart.* [a synonym of *P. aequalis* (Vell.) *J. F. Macbr.*], an obviously closely related species.

Citations: BRAZIL: Minas Gerais: Magalhães Gomes 1372 [Macbride photos 10614] (B—type, N—photo of type, N—photo of type, W—photo of type, Z—isotype); Widgren 333 (Br, N), s.n. [Minas Gerais, 1845] (Br, N). Rio Grande do Sul: Sehnem 5453 (B). Santa Catarina: Rambo 49606 (Le, N, S).

PAEPALANTHUS HERZOGII Moldenke, Revist. Sudam. Bot. 4: 17. 1937.

Synonymy: Paepalanthus ruhlandii Herzog ex Lützelburg, Estud. Bot. Nordést. 3: 149—150, hyponym (1923) in Fedde, Repert. Spec. Nov. 20: 87. 1924 [not P. ruhlandii Alv. Silv., 1903]. Paepalanthus herzogii Macbr. ex Moldenke, Résumé Suppl. 12: 11, in syn. 1965.

Bibliography: Lützelburg, Estud. Bot. Nordést. 3: 149—150. 1923; Herzog in Fedde, Repert. Spec. Nov. 20: 87. 1924; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 174. 1929; Moldenke, Revist. Sudam. Bot. 4: 17. 1937; Moldenke, Known Geogr. Distrib. Erioc. 13, 49, & 53. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 158, 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 145. 1952; Moldenke, Résumé 98, 328, & 487. 1959; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 584, 590, & 952. 1971; Moldenke, Phytologia 25: 154. 1973.

This species is based on Lützelburg 278, collected on granite, at 1200 meters altitude, in the Serra Marsalina, central Bahia, Brazil, in August, 1914, where, according to the collector (1923), it is typical of the "carrasco" formation. The type specimen, in the herbarium of the Botanische Staatssammlung in Munich, was photographed there by Macbride as his type photograph number 18724. It should be noted that the type is labeled "278a" and its label indicates "Bom Jesus, 1000 m" as the type locality. It was annotated as "P. herzogii Macbr." by Macbride, but his binomial was never validly published by him as far as I have been able to determine.

Herzog (1924) says that the species is "Aus der Verwandtschaft von P. brachypus Kunth; aber durch die wenig zahlreichen kurzen und fast kahlen Blätter gut unterschieden."

Citations: BRAZIL: Bahia: Lützelburg 278a [Macbride photos 18724] (Mu—type, N—photo of type, W—photo of type, Z—isotype).

PAEPALANTHUS HETEROCAULON Alv. Silv., Fl. Mont. 1: 203—205, pl. 134. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 203—205 & 408, pl. 134. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Résumé Suppl. 12: 4. 1965; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 134. 1928.

This species is based on A. Silveira 775, collected "In campis arenosis, inter Serro et Diamantina, in Serra Geral", Minas Gerais, Brazil, in January of 1925 and deposited in the Silveira herbarium. On page 408 of his work (1928), Silveira gives the year of collection of the type as "1926", but whether this is intended as a correction of the date given by him on page 205 or represents a typographic error, is not clear.

Citations: BRAZIL: Rio de Janeiro: Strang 244 [Herb. Cent. Pesq. Florest. 786] (Z).

PAEPALANTHUS HETEROPUS Alv. Silv., Fl. Mont. 1: 139—140, pl. 87. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 139—140 & 408, pl. 87. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 87. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 686) "In campis arenosis prope Itambé do Serro", Minas Gerais, Brazil, in April, 1918, and is deposited in the Silveira herbarium. Curiously, on page 408 of his work (1928), Silveira writes the name of the type locality as "Serra do Itambé". Thus far, the species is known only from the original collection.

PAEPALANTHUS HETEROTRICHUS Alv. Silv., Fl. Mont. 1: 200—201, pl. 132. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 200—201 & 408, pl. 132. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 132. 1928.

The type of this species was collected by J. G. Michaeli "In campis arenosis in Serra do Cipó", Minas Gerais, Brazil, in August of 1921 and is no. 721 in the A. Silveira herbarium. Silveira (1928) comments that the "Species ob pilositatem pedunculorum distinctissima". It is known thus far only from the original collection.

PAEPALANTHUS HILAIREI Körn. in Mart., Fl. Bras. 3 (1): 332, pl. 46, fig. 2. 1863.

Synonymy: Eriocaulon maximiliani Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 620, pl. 1. 1831 [not E. maximiliani Schrad., 1824]. Eriocaulon bongardii A. St. Hil., Voy. Distr. Diam. 2: 444. 1833. Paepalanthus maximiliani Kunth, Enum. Pl. 3:

513—514. 1841. Eriocaulon bongardi Kunth ex D. Dietr., Syn. Pl. 5: 261. 1852. Eriocaulon bongardi St. Hil. apud Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 333. 1855. Paepalanthus hilairei var. α Körn. in Mart., Fl. Bras. 3 (1): 332. 1863. Eriocaulon (Paepalanthus) maximiliani Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 332, in syn. 1863. Dupatya hilairei (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya hilairei Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus hilairei f. typica Ruhl. in Engl., Pflanzenreich 13 (4-30): 195. 1903. Eriocaulon maximiliani Mart. [in part] ex Moldenke, Known Geogr. Distrib. Erioc. 37, in syn. 1946 [not E. maximiliani Schrad., 1824]. Paepalanthus hilairei Körn. ex Angely, Fl. Paran. 10: 5, sphalm. 1957. Paepalanthus hilairei f. compacta Ruhl. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus hilairei Körn. ex Rennó, Levant. Herb. Inst. Agron. 70, sphalm. 1960. Paepalanthus hilairei Körn. ex Moldenke, Résumé Suppl. 6: 10, in syn. 1963. Paepalanthus hilairei Körn. ex Moldenke, Résumé Suppl. 12: 11, in syn. 1965. Paepalanthus hilaireae Kunth ex Moldenke, Phytologia 25: 241, in syn. 1973. Actinocephalus hilairei Körn., in herb.

Bibliography: Roem. & Schult., Mant. 2: 470. 1824; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 620 & 637. 1831; Bong., Ess. Monog. Erioc. 5 & 6. 1831; A. St. Hil., Voy. Distr. Diam. 2: 443—444. 1833; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 512—514, 516, 572, & 625. 1841; Mart., Flora 24, Beibl. 2: 35. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273—274, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 332, 499, & 507, pl. 46, fig. 2. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 7, 10, 190, 195—196, 254, 284, 286, & 290, fig. 2 C. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 294. 1908; Lützelburg, Estud. Bot. Nordést. 3: 149. 1923; Alv. Silv., Fl. Mont. 1: 200 & 408. 1928; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 43 & 44, fig. 16 C. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 32, 37, 49, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Alph. List Cit. 3: 710 & 731. 1949; Moldenke, Phytologia 3: 142 (1949) and 4: 145. 1952; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 236. 1956; Angely, Fl. Paran. 10: 5. 1957; Moldenke, Résumé 98, 286, 290, 325, 326, 487, & 494. 1959; Moldenke, Résumé Suppl. 1: 20 & 21. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 & 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 3: 34 (1962), 6: 10

(1963), and 12: 11. 1965; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 160, 162, 174, 187, & 189—191. 1969; Moldenke, *Fifth Summ.* 1: 162 & 414 (1971) and 2: 494, 505, 584, 586, & 952. 1971; Moldenke, *Biol. Abstr.* 56: 3000. 1973; Moldenke, *Phytologia* 25: 229, 238, 239, & 241 (1973) and 26: 229. 1973.

Illustrations: Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, ser. 6, 1: pl. 1. 1831; Körn. in Mart., *Fl. Bras.* 3 (1): pl. 46. 1863; Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 7, fig. 2 C. 1903; Ruhl. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 2, 15a: 43, fig. 16 C. 1930.

Körnigke based this species, insofar as his typical "var. 4" is concerned, on the following cotype specimens: from Minas Gerais - (1) Martius 897, (2) Schüch s.n., (3) Ackerman s.n., (4) P. Clausen 3, (5) Arendt s.n., (6) in arenosis et lapidosis Serra Lenheiro, L. Riedel s.n., and (7) S. Joze atque prope S. João, Junio, L. Riedel s.n., and from Rio de Janeiro - (8) inter Rio de Janeiro et Campos, Sellow s.n. and (9) near Sebastianopolis, Lhotzky s.n. He describes the typical form as "var. 5. foliis caulinis glabris vel subtus breviter pilosulis, ciliatis; foliis ramorum ciliatis, ceterum glabris". However, his binomial is obviously only a new name for Eriocaulon maximiliani Bong., the specific epithet of which was not available for use in the genus Paepalanthus because of Schrader's homonym in 1824. Therefore Bongard's type specimen should be regarded as the actual type of P. hilairei. This appears to be L. Riedel 289. Macbride photographed a Pohl collection in the Munich herbarium as his type photograph number 18702, but this specimen, as has proved true in the case of many of the photographs which he took, is not the type of anything.

It should be noted that the Eriocaulon maximiliani of Martius is in part Paepalanthus hilairei and in part Syngonanthus nitens var. filiformis (Bong.) Ruhl., while E. maximiliani Schrad. is a synonym of P. ramosus (Wikstr.) Kunth.

Körnigke's P. hilairei var. β is what we now call P. ramosus; his var. γ is what we now call P. hilairei var. maximiliani Ruhl.; while his var. δ is P. hilairei var. pohlianus Moldenke and his var. ϵ is P. hilairei var. plauhyensis Ruhl.

Kunth (1841) comments that "E. Maximiliani (Schrad. ?) Bong. est Paepalanthus Maximiliani", but actually Bongard's plant is P. hilairei and Schrader's is P. ramosus. Some authors in the past have regarded E. bongardi Kunth as a separate and valid specific taxon.

Because of the considerable confusion over the identity of the various plants referred to in the synonymy above, it may be worthwhile to repeat here the original descriptions of some of them. Bongard's Eriocaulon maximiliani (1831) is described as "Caule ramoso, dense folioso; foliis caulinis basi vaginantibus, patentibus, lanceolato-acuminatis, canaliculatis; junioribus cil-

iatis; pedunculis pubescentibus; vaginis glabris".

Schrader's Eriocaulon maximiliani (1824) is described as "Caulis 2-pedalis, superne in ramos 3--4 cauli similes divisus, foliosus. Folia coriacea, supra glabra, subtus pubescentia, margine pilis longioribus ciliata; radicalia 3--4-pollicaria, lineari-lanceolata, superne attenuata, plana; caulina 1 1/2 -poll., amplexicaulia, ovato-lanceolata, longissime acuminata, canaliculata, subsquarrosa. Umbella e pedunculis 300--400 pluribusve subbipollicaribus pubescentibus, basi ochreatis. Capitula magnitudine grani piperis nigri, obovata, apice albo-pilosa. Involucrum foliola imbricata, apice rotundata, capitulo paulo breviora calyceque ciliata. Affinis Eriocaulo ramoso Wikstr."

Paepalanthus maximiliani Kunth is described by Kunth (1841) as follows: "P. Maximiliani. Caule ramoso, dense folioso; foliis caulinis basi vaginantibus, patentibus, lanceolato-acuminatis, canaliculatis; junioribus ciliatis; pedunculis pubescentibus; vaginis glabris. Bong. Eriocaulon Maximiliani Schrad in Roem. et Schult. Mant. 2. 470*)? Bong. in Act. Petrop. 6. 1. 620. 637, t. 1. - Brasilia, in arenosis et lapidosis Serra Lenheira et de St. Jose. (Luschnath prope Tejuco legit [v.s.]. 4.) He continues with details, in his usual fashion: "Caulis erectus, ramosus, ad insertiones foliorum pilosus. Folia basi dilatata caulem amplexentia, patentia, squarrosa, supra canaliculata, subtus convexa, mucronata, subpungentia, juniora pilosiuscula margineque pilis albis ciliata, demum glabriuscula, 2 1/2 -- 3-pollicaria. Pedunculi creberrimi (circa 300), umbellati, aequales, 3--4-pollicares, pubescentes. Vaginae glabrae, apice oblique fissae. Capitula subglobosa, albo-lanata, magnitudine seminis piperis nigri. Bractee involucrantibus steriles, breves, ovato-oblongae, ciliatae; bractee flores stipantes acuminatae, ad apicem pilosae. Receptaculum pilosum. Flores masculi et feminei mixti; illi pedicellati: Sepala 3 exteriora acuta, apice pilosa; 3 interiora in tubum obconicum, apice 3-lobum concreta, acuta. Antherae oblongae, flavae. Fem.: Sepala 3 exteriora oblonga, acuta, margine pilosa; 3 interiora libera, ovata, acuta, basi angustiora, margine pilis longis obsita. Styli (appendices Bong.) simplices, filiformes. Capsula tricocca. Semina lineis longitudinalibus transversalibusque rugulosa. Pili bractearum et calycis exterioris masculi et feminei breves, albi, opaci. (Bong.) Differt a planta Schraderiana statura altiore, pedunculis longioribus, squamis (bracteis involucrantibus) capitulo multo brevioribus. (Bong.) Specimina a Sellowio in Serra da Piedade lecta a Bongardianis differunt pedunculis glabris (potius ob pilos delapsos glabratis?)." He cites, and apparently uses as the basis of his description, a Luschnath unnumbered specimen collected near Tejuco "in arenosis et lapidosis Serra Lenheira et de St. Jose". In this same work, Kunth keys out the species as follows: "Staminibus 3--6 (sive partibus calycis ternariis); capitulis pilosolanatis; stigmata indivisa (sepala exteriora feminea fructifera haud rigescentia?); umbellata, caulescentia, pedunculis in umbellum dispositis aequalibus". In his discussion of P. poly-

anthus (Bong.) Kunth he notes that it "Differt a P. Maximiliani caulibus caespitosis, simplicibus, foliis radicalibus lato-lanceolatis, caulinis adpressis, planis, pedunculis dimidio brevioribus, pilosis, vaginis bifidis".

Ruhland (1903) cites Körnicke's original publication as page "323" instead of 332 as it actually is. He differentiates the typical form of this species from the other recognized forms as "Differt foliis caulinis glabriusculis vel pilis brevibus sparsis ornatis; capitulis maturis globosis, persistenter niveo-villosis; bracteis involucrentibus floribus reflexis cito inconspicuis". He cites from Minas Gerais: Glaziou 15516, Pohl 3634, L. Riedel s.n. [Serra Lenheiro, S. José, & S. João], & Silveira 3; from Rio de Janeiro: Lhotzky s.n. and Sellow s.n.; from Goiás: Glaziou 22321; and from "zwischen Alegres und Trinidad" Pohl 2033.

Recent collectors describe P. hilairei as an erect plant, to 1 m. tall, with white flower-heads, and have found it growing on campos slopes. Irwin and his associates found it "on steep sandy slopes with sandstone outcrops at summit". It has been encountered at 1300 m. altitude, flowering in February and from April to September.

Paepalanthus hilairei f. compacta, which Ruhland apparently never got around to publishing in his formal monograph of the family, seems to be based on Glaziou 22321 in the Brussels herbarium and P. Clausen s.n. at Berlin. It should also be noted that Eriocaulon maximiliani Bong. is cited by Körnicke (1863) as the basis for his Paepalanthus hilairei var. N.

Material of this species has been misidentified and distributed in some herbaria under the names Eriocaulon maximiliani Schrad. and E. rigidum Bong. On the other hand, the Ackermann s.n. [1832], distributed as P. hilairei, is actually P. clausenianus Körn., Clausen 267 and Martius 880, 886, 897, s.n. [In distr. adamant. Majo 1818], and s.n. [In districtu adamant. ad Curralinho] are P. hilairei var. maximiliani Ruhl. (the last-mentioned being a cotype collection of it), and Ackerman s.n. [1832] and Lucae s.n. [Tijuca] are P. ramosus (Wikstr.) Kunth. The Clausen specimen cited below from the Cornell University herbarium was previously cited by me (1952) from the Britton Herbarium, from which it was later transferred to Cornell. The Glaziou 15516 cited by Ruhland (1903) is actually P. ramosus (Wikstr.) Kunth.

Additional citations: BRAZIL: Bahia: Lützelburg 27 (N). Goiás: Cutler 8040 (N); Glaziou 22321 (Br, W--1185376). Minas Gerais: Archer & Mello Barreto 5016 [Herb. U. S. Nat. Arb. 177511] (Be--39317, W--2121795); Arendt s.n. (B); P. Clausen s.n. [1834] (Br), s.n. [Aug.--April 1840] (Br, Br), s.n. (B); Glaziou 17301 (Br, N); Irwin, Maxwell, & Wasshausen 20138 (N, 2); Lhotzky s.n. [prope Sebastianopol] (B); Macedo 2759 (N, S); Mello Barreto 700 [Herb.

Jard. Bot. Bello Horiz. 4811; Herb. U. S. Nat. Arb. 236376] (W—2109953), 2499 [Herb. Jard. Bot. Bello Horiz. 7880; Herb. U. S. Nat. Arb. 236368] (W—2109985), 2524 [Herb. Jard. Bot. Bello Horiz. 8228; Herb. U. S. Nat. Arb. 236397] (W—2109990), 4714 [Herb. Jard. Bot. Bello Horiz. 17544; Herb. U. S. Nat. Arb. 236403] (W—2121716); Mexia 5764 (S, W—1571903); L. Riedel 289 (M—cotype, S—cotype), s.n. [Minas] (Br); Sellow B.553, Ar.5, P.3 (B, B). State undetermined: P. Clausen s.n. (It); Glaziou 15516 (Br); Sellow s.n. [Brasilia] (Br). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B, B, B); Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 1. 1831 (N, Z); Körn. in Mart., Fl. Bras. 3 (1): pl. 46. 1863 (B).

PAEPALANTHUS HILAIREI var. MAXIMILIANI Ruhl. in Engl., Pflanzenreich 13 (4-30): 196. 1903.

Synonymy: Paepalanthus hilairei var. γ Körn. in Mart., Fl. Bras. 3 (1): 332. 1863. Paepalanthus difficilis Ruhl. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 332. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 196, 290, & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 294. 1908; Alv. Silv., Fl. Mont. 1: 408. 1928; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Phytologia 4: 145. 1952; Moldenke, Résumé 98, 325, & 487. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 580, 584, & 952. 1971.

Ruhland (1903) plainly proposes this trinomial for the P. hilairei var. γ of Körnicke (1863), and this, in turn, was typified by Körnicke by the following four collections, probably all deposited in the Munich herbarium: (1) in altis Minarium: Claussen, (2) in districtu adamant. ad Curralinho: M[artius], (3) in Serra da Piedade: Sellow, and (4) in campis editis arenosis lapidosisque inter Alegres et Rio S. Francisci, Septembri: Riedel. He describes it as "var. γ . apice caulis sterili valde elongato; foliis caulinis ut in var. ϕ ., vel subtus molliter pubescentibus, multo majoribus; foliis ramorum ut in var. β . P. Maximiliani Kunth p.p. (spec. Sellow in Serra da Piedade lect. v.s.)". Ruhland, however, in 1903 cites only Sellow s.n. [Serra da Piedade], Minas Gerais, in the Berlin herbarium, and L. Riedel s.n. "aus hochgelegenen, sandigen und steinigen Campos zwischen Alegres und dem Rio S. Francisco", also in Minas Gerais, flowering in September. He differentiates this variety as "Differt a forma typica foliis caulinis subito angustatis, mucronatis, valde ciliatis, subtus persistenter pubescentibus; vaginis paullo laxioribus quam in confinibus; foliis ramorum ramulorumque primum pubescentibus, dein glabris, rarius subpersistenter pubescentibus (ut in specimenibus a cl. Riedel collectis); caule sterili perspicue elongato; capitulis exacte globosis vel demum verticaliter elongatis, mox

glabrescentibus; foliis omnibus longioribus quam in typo et insequente [var. piahyensis]".

The type of Paepalanthus difficilis appears to be an unnumbered collection made by Ludwig Riedel and merely labeled "Brasilia" in the Berlin herbarium and so annotated by Ruhland. It had previously been annotated by Körnicke as P. hilairei var. γ .

Paepalanthus maximiliani Kunth is cited (in part) by Körnicke (1863) as a synonym of his P. hilairei var. γ , but Kunth's binomial is plainly only a transfer of Bongard's Eriocaulon maximiliani to the genus Paepalanthus, regardless of Kunth's amplification of the diagnosis, and so the name belongs in the synonymy of typical P. hilairei Körn.

Recent collectors describe P. hilairei var. maximiliani as an herb to 1 m. tall, growing in wet fields, in cerrado, and along roadsides, from sealevel to 800 m. altitude, and have found it flowering in April, May, August, and September and in fruit in August. Silveira (1928) cites A. Silveira 696 from the Serra do Cipó, Minas Gerais, Brazil, collected in 1918. The Guillemin 223 cited by me in a previous installment of these notes (1952) proves to be P. ramosus (Wikstr.) Kunth instead.

Material of this variety has been misidentified and distributed in some herbaria as typical P. hilairei Körn., Eriocaulon maximiliani Schrad., E. rigidum Bong., and Actinocephalus hilairei Körn.

Citations: BRAZIL: Goiás: Irwin, Grear, Souza, & Reis dos Santos 14549 (N, Z); Lützelburg 614 (Mu); J. E. Pohl s.n. (Br). Guanábara: L. B. Smith 6401 (W—2120186, W—2120187, Z). Minas Gerais: Archer 4062 (W—1705677); P. Clausen s.n. [1835] (Br, N); F. C. Hoehne 5212 (Mu); Martius 886 (Mu), 888 (Mu), 897 (Br, Mu), s.n. [in distr. adamant. Majo 1818] (Mu), s.n. [In districtu adamant. ad Curralinho] (Mu—cotype), s.n. [Distr. adamant.] (Mu); J. E. Pohl 2033 (Br); L. Riedel s.n. [Brasilia] (B, B); Sellow post B.1300, C.280 (B). State undetermined: P. Clausen 267 (It, N); R. E. Pohl s.n. [in Brasilia; Macbride photos 18702] (Mu, Mu, N—photo, W—photo). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS HILAIREI var. PIAHYENSIS Ruhl. in Engl., Pflanzenreich 13 (4-30): 196. 1903.

Synonymy: Paepalanthus hilairei var. ζ Körn. in Mart., Fl. Bras. 3 (1): 332. 1863. Paepalanthus hilairei var. pihuhyensis Ruhl. ex Alv. Silv., Fl. Mont. 1: 408. 1928. Paepalanthus hilairei var. piuhyensis Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 49, sphalm. 1946. Paepalanthus piuhyensis Ruhl. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 332. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 196 & 290. 1903; Alv. Silv., Fl. Mont. 1: 408. 1928; Moldenke, Known Geogr. Distrib. Erioc. 13

& 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Phytologia 4: 145. 1952; Moldenke, Résumé 98, 325, 419, 487, & 494. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 584, 588, 778, & 952. 1971.

The type of this variety was collected by George Gardner (no. 2968) somewhere in Piauí, Brazil, and is deposited in the herbarium of the Botanisches Museum in Berlin. The variety is plainly based on Körnicke's *P. hilairei* var. $\bar{\epsilon}$, which he has described as "var. $\bar{\epsilon}$. foliis omnibus utrinque pilis mollibus incano-villosis: in prov. Piauiensis: Gardner 2968." Silveira (1928) cites A. Silveira 798 from near Serrinha, Grão Mogol, Minas Gerais. As far as I know, these are the only two known collections of the variety.

Citations: BRAZIL: Piauí: G. Gardner 2968 (B--type, W--937185--isotype).

PAEPALANTHUS HILAIREI var. *POHLIANUS* Moldenke, Phytologia 25: 229 & 241, hyponym. 1973; comb. nov.

Synonymy: *Paepalanthus hilairei* var. $\bar{\epsilon}$ Körn. in Mart., Fl. Bras. 3 (1): 332. 1863.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 332. 1863; Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 25: 229 & 241. 1973.

This variety is based on two collections by R. E. Pohl from "in prov. Gouazensi et Minarum locis altis", probably deposited in the Berlin herbarium but now destroyed. The original description by Körnicke (1863) is "var. $\bar{\epsilon}$. foliis ramorum supra glabris, subtus pilis subretrorsis mollibus dense et persistenter incano-pubescentibus". In Phytologia 25: 241 it was erroneously stated that this taxon is based on Körnicke's var. $\bar{\epsilon}$.

PAEPALANTHUS HISPIDISSIMUS Herzog ex Lützelburg, Estud. Bor.

Nordést. 3: 148 & 150, hyponym. 1923; Herzog in Fedde, Repert. Spec. Nov. 20: 85. 1924.

Bibliography: Lützelburg, Estud. Bot. Nordést. 3: 148 & 150. 1923; Herzog in Fedde, Repert. Spec. Nov. 20: 85 & 86. 1924; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 174. 1929; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Phytologia 4: 145. 1952; Moldenke, Résumé 98 & 487. 1959; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

This species is based on Lützelburg 317 from sandstone along the [Alto] Rio de Gurgucia, in southern Piauí, and Lützelburg 12657 from Bom Jesus [do Rio de Contas], in the "Carrasco-Gebiet" of central Bahia, Brazil, deposited in the Munich herbarium. Lützelburg (1923) says that it is also found at Brejo do Dorreio and Parnaguá in southern Piauí. It has been encountered at 1000 m. altitude.

Herzog (1924) comments that "Durch die borstlichen, lang behaarten in ein dichtes Kugelpolster vereinigten Blätter und die fast pappusähnlichen behaarten Scheidenöffnungen auf den ersten Blick leicht zu erkennende ausserst zierliche Art. Wohl am ehesten in die Verwandtschaft von P. Uleanus Ruhl. gehörig."

Macbride photographed Lützelburg 15506 in the Munich herbarium as his type photograph number 18704, but this photograph is of a collection not cited by Herzog. It is also not possible to tell from the photograph if the specimen is part of 15506a or 15506b since the label does not appear in the photograph.

Citations: BRAZIL: Bahia: Lützelburg 15506 [Macbride photos 18704] (N--photo, W--photo), 15506a (Mu, Z), 15506b (Mu). Piauf: Lützelburg 317 (Mu--cotype).

PAEPALANTHUS HOMOMALLUS (Bong.) Mart. ex Körn. in Mart., Fl.

Bras. 3 (1): 340. 1863.

Synonymy: Eriocaulon homomallum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 626. 1831. Eriocaulon heteromallum Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334, in syn. 1855. Dupatya heteromalla (Bong.) Kuntze, Rev. Geb. Pl. 2: 746. 1891. Paepalanthus homomallus Mart. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya homomalla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus homomallus Mart. ex Moldenke, Fifth Summ. 2: 584, in syn. 1971.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 626. 1831; Bong., Ess. Monog. Erioc. 26. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 340, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 6, 8, 214, 217, [283], 286, & 290. 1903; Alv. Silv., Fl. Mont. 1: 260 & 261. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 42. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 35, & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Alph. List Cit. 3: 855. 1949; Moldenke, Phytologia 4: 145. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 280, 289, & 487. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 11. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 159 & 190. 1969; Moldenke, Phytologia 20: 367. 1970; Moldenke, Fifth Summ. 1: 162 & 481 (1971) and 2: 502, 584, & 952. 1971.

This species is based on L. Riedel 1047, "Habitat in glareosis Serra da Lapa", Minas Gerais, Brazil, deposited in the Leningrad herbarium. Macbride photographed an isotype in the Berlin herbar-

ium as his type photograph number 10615. Bongard's original description (1831) is "acaule; foliis caespitosis linearibus obtusiusculis piloso-incanis subhomomallis; pedunculo solitario incano; vagina apice barbata. Tab. XXXIX....Flor. Novembri. .". His plate appears never to have been published. In this connection Steudel (1855) says "Tabulae nr. 36 et sequentes in opera citato nondum sunt evulgatae sed modo diagnoses nimis breves illustrationes fusiores adhuc expectantes; hinc inter has specie obiter tantum a Bongardo descriptas plures jam prius a Martio et Kunthio et nunc a me ipso sub aliis denominationibus irrepsisse vis dubitari potest." Ruhland (1903) cites only the type collection.

Additional citations: BRAZIL: Minas Gerais: L. Riedel 1047 [Macbride photos 10615] (B--isotype, Br--isotype, N--photo of isotype, N--photo of isotype, S--isotype, Ut--364--isotype, W--photo of isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS HYDRA Ruhl. in Engl., Pflanzenreich 13 (4-30): 202. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 202, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 408. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 52. 1930; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960; Moldenke, Fifth Summ. 1: 162 (1971) and 2: 952. 1971.

This species is based on two collections from Minas Gerais, Brazil, deposited in the Berlin herbarium: (1) Schwacke 12040 from damp sandy places at the foot of Serra de Lavras Novas, December 1895, and (2) Schwacke 13856 from Chapada, Serra de Itatiaia, October, 1899, the former photographed by Macbride at Berlin as his type photograph number 10616. Ruhland (1903) says of the plant "Species foliorum consistentia longe ab omnibus affinis discrepans. Accedit glabrietate foliorum, eorumque forma, atque vaginae breves, ciliatae." The specific epithet is uppercased by Prain (1908).

Irwin and his associates describe the plant as a "rosette herb, the inflorescences ascending to 20 cm." and found it growing "in cerrado on outcrops, brejo, and gallery forest", at 1150 meters altitude. It has been collected in anthesis in March, October, and December. Silveira (1928) cites A. Silveira 411 from the Serra do Itatiaia, collected in 1910.

Citations: BRAZIL: Minas Gerais: Irwin, FONSECA, Souza, Reis dos Santos, & Ramos 28565 (N, Z); Macedo 2760 (N, S, S); Maguire, Mendes Magalhães, & Maguire 49305 (N); Schwacke 12040 [Macbride photos 10616] (B--cotype, N--photo of cotype, N--photo of cotype, W--photo of cotype), 13856 (B--cotype).

[to be continued]

NOTES ON NEW AND NOTEWORTHY PLANTS. LXXIV

Harold N. Moldenke

LANTANA CAMARA var. *VARIA* (Kuntze) Moldenke, *Known Geogr. Distrib.*

Verbenac., [ed. 2], 161 & 189, nom. nud. 1949; comb. nov.

Camara aculeata \times *subinermis* f. *varia* Kuntze, *Rev. Gen. Pl.* 2: 503. 1891.

OXERA PULCHELLA var. *BREVICALYX* Moldenke, var. nov.

Haec varietas a forma typica speciei calicibus toto 6—9 mm. longis recedit.

This variety differs from the typical form of the species in having its calyxes during anthesis only 6—9 mm. in total length, including the lobes.

The type of the variety was collected by Grady Linder Webster and Richard Hildreth (no. 14633) in woods of *Acacia* and *Dodonaea* on iron-concreted serpentine soil between Riv. Rouge and Riv. Blanche, 19 km. by road southeast of Pouemboutm at an altitude of about 30 m., near Poya, New Caledonia, on August 9, 1968, and is deposited in the herbarium of the University of Michigan at Ann Arbor. The collectors describe the plant as a vine with white flowers.

PAEPALANTHUS PLANIFOLIUS var. *VILLOSUS* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis supra puberulis subtus dense longeque griseo-villosis recedit.

This variety differs from the typical form of the species and from all other described varieties in having its short (10—15 cm. long) leaves puberulent above and very densely long-villous beneath with weak, soft, gray, irregularly disposed hairs which are quite conspicuous and persistent on dried specimens.

The type of the variety was collected by Francis Raymond Fosberg (no. 43331) on a mineral soil bank in an open grassy bog 1 km. northwest of the Campo Grande railway station, municipality of Ribeirão Pires, São Paulo, Brazil, on October 28, 1962, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector notes that the plant was "occasional" at the type locality, with "Large rosettes, heads almost globose".

VERBENA SCABRA f. *TERNIFOLIA* Moldenke, f. nov.

Haec forma a forma typica speciei foliis ternatis recedit.

This form differs from the typical form of the species in its apparently uniformly ternate leaves.

The type of the form was collected by Robert Eckhardt (no. 1739) at Dove Creek on the Tweedy Ranch at Knickerbocker, Tom Green County, Texas, on July 19, 1974, and is deposited in my personal herbarium at Plainfield, New Jersey. The plant was 1.5 m. tall, with blue flowers, and "locally frequent."

BOOK REVIEWS

Alma L. Moldenke

"EVOLUTION OF SEX IN PLANTS" by John Merle Coulter, vi & 140 pp., illus., Facsimile Edition by Hafner Press of Macmillan Publishing Co., N. Y. 10022. 1973. \$6.95.

This replication of the original 1914 edition by one of the great botanical teachers and leaders of all time carries a new brief introduction by the well-known algologist, F. Drouet, who states that "the material discussed.....[is still] relevant today.....in spite of recent advances in morphology, cytology, general physiology, and systematics of plants and the prodigious growth of the sciences of genetics, electron microscopy, and biochemistry."

Now the present-day student, the interested layman, and the newer generations of scientists with any interest in this topic can have ready and inexpensive access to the careful descriptions and reasoning that lead to the author's conclusion that "the impression one obtains of sexuality as a method of reproduction is that it represents protoplasts engaged in reproduction under peculiar difficulties that do not obtain in reproduction by spores or by vegetative multiplication, and that its significance lies in the fact that it makes organic evolution more rapid and far more varied."

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